AD ________________

CONTRACT NUMBER DAMD17-92-C-2066

TITLE: Evaluation of Biomonitoring Systems for Assessment of Contaminated Waters and Sediments at U.S. Army Installations

SUBTITLE: Biomonitoring Evaluation of Contaminated Groundwater at Aberdeen Proving Ground - Edgewood Area West Branch of Canal Creek - Phase 1: Groundwater Evaluation

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REPORT DATE: November 1995

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	November 1995	Annual (July 31, 1994 - June 30, 1995)

4. TITLE AND SUBTITLE Evaluation of Biomonitoring Systems for Assessment of Contaminated Water and Sediments at U.S. Army Installations - Evaluation of Contaminated Groundwater at Aberdeen Proving Ground-Edgewood Area West Branch of Canal Creek - Phase 1: Groundwater Evaluation.

5. FUNDING NUMBERS
DAMD17-92-C-2066

6. AUTHOR(S)
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The University of Maryland at College Park
Wye Research and Education Center
Queenstown, Maryland 21658

8. PERFORMING ORGANIZATION REPORT NUMBER
WREC-95-05

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Ft. Detrick, Frederick, MD 21702-5012

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)* Contaminated groundwater, which contained multiple heavy metals and chlorinated aliphatic hydrocarbons, from the Canal Creek aquifer (well CC-27B) of the U.S. Army Aberdeen Proving Ground-Edgewood Area, Aberdeen, Maryland, was evaluated for toxicity to aquatic organisms. Toxicity was detected at various groundwater concentrations by 6 of 8 biomonitoring systems. The lowest concentration of groundwater that caused no observable adverse effect (NOEC) at pH 4 was 10% ground water by volume in the following assays: 4-d green alga (Selenastrum capricornutum) growth test; 7-d cladoceran (Ceriodaphnia dubia) survival and reproduction test; and 96-h frog (Xenopus laevis) embryo teratogenesis assay - Xenopus (FETAX). A NOEC of 18% groundwater volume occurred in 7-d fathead minnow (Pimephales promelas) survival and growth tests. Buffered groundwater (pH 7) was less toxic and/or not toxic in 7-d fathead minnow tests and in FETAX assays. The 10% groundwater by volume NOECs for the green alga and cladoceran at pH 4 did not change when the organisms were exposed to buffered groundwater at pH 7. The Ames assay for mutagenicity was negative in all cases. Sporadic incidences of lesions were found in Japanese medaka (Oryzias latipes) at concentrations up to 25% groundwater by volume after 9 months of exposure. Fish growth was affected by 9 months of exposure; fish were smaller when grown in groundwater diluted with West Branch of Canal Creek water.

14. SUBJECT TERMS Biomonitoring, bioassays, acute toxicity, chronic toxicity, Ames, FETAX, histopathology, groundwater, priority pollutants, heavy metals, and chlorinated aliphatic hydrocarbons.

15. NUMBER OF PAGES 1,188

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

FOREWORD

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( ) In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institutes of Health.

D. T. Burton
Principal Investigator's Signature

11-30-95
Date

Certification of Technical Data Conformity (May 1987)

The contractor, The University of Maryland System, hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. DAMD17-92-C-2066 is complete, accurate, and complies with all requirements of the contractor.

Date: November 30, 1995

Name and Title of Certifying Official: D. T. Burton

Dennis T. Burton, Ph.D
Senior Research Scientist

EXECUTIVE SUMMARY

The toxicological evaluation of groundwater contamination at the U.S. Army Aberdeen Proving Ground-Edgewood Area (APG-EA), West Branch of Canal Creek Area, Aberdeen, MD, was designed to be conducted in two sequential phases. Phase 1 was a determination of the potential toxicity of the groundwater in situ. If the Phase 1 evaluation showed that the groundwater was not toxic, further hazard assessment studies of the West Branch of Canal Creek ecosystem would not be necessary. Phase 2, an evaluation of the potential toxicity of the groundwater as it moves through the marsh and bottom sediments into West Branch of Canal Creek, was to be implemented if the groundwater proved to be toxic. As discussed in this report, the groundwater was found to be toxic in Phase 1. The data in Phase 1 will be integrated with the Phase 2 data to make a preliminary hazard assessment of the groundwater discharge in West Branch of Canal Creek. The Phase 2 studies and analyses will be given in a separate report.

The primary objective of Phase 1 was to evaluate the potential toxicity of the groundwater in situ to aquatic organisms because it was known that the groundwater entered the West Branch of Canal Creek ecosystem. Although microorganisms are the primary organisms present in most subsurface environments, an array of surrogate biomonitoring systems integrated into a tiered hazard framework was used in the evaluation. An array of biomonitoring assays covering several levels of biological complexity was used to maximize predictability of potential adverse pollutant effects to aquatic organisms during a 9-month evaluation. A secondary objective of Phase 1 was to evaluate, where test systems were appropriate for use in low salinity waters, the potential toxicity of West Branch of Canal Creek water. The West Branch of Canal Creek studies were conducted concurrently with the groundwater studies to obtain background data on the potential toxicity of the creek water. Only aqueous phase assays were used in the water column studies of West Branch of Canal Creek water; no sediment systems were studied.

The contaminated groundwater in the West Branch of Canal Creek study area contains multiple heavy metals and chlorinated aliphatic hydrocarbons. Groundwater was withdrawn from well CC-27B, which is one of the two most highly contaminated wells located in the Canal Creek aquifer at the West Branch of Canal Creek site.

Several U.S Environmental Protection Agency (EPA) priority pollutant heavy metals were found in the groundwater. Copper, mercury, and silver concentrations in the groundwater exceeded, in one or more tests, EPA's numerical water quality criteria for the specific metal. Aluminum was also present at high

concentrations in the groundwater; however, EPA has not finalized their draft numerical water quality criteria for the metal. Thus, it is not clear whether or not the concentrations in the groundwater may exceed EPA's numerical water quality criteria for aluminum.

Thirteen chlorinated aliphatic compounds were found in the groundwater, several of which are EPA priority pollutants. None of the priority pollutant organics found in the groundwater currently have numerical water quality criteria values; however, lowest observed effect levels (LOEL) for several of the compounds are available. All of the LOELs are one or more orders of magnitude higher than the concentrations found in the groundwater.

Eleven of the 13 volatile organics found in the groundwater had octanol water partition coefficients (log k_{ow} or log P) less than 3. Thus, bioaccumulation was not considered to be a potential toxicological problem for most of the volatile organics present in the groundwater. 1,2-Dichlorobenzene and 1,2,4-trichloro-benzene, which have K_{ows} of 3.4 and 4.2, respectively, were found in only one groundwater sample at the beginning of the study. Thus, it is difficult to determine how important bioaccumulation may be for the two compounds.

An array of eight biomonitoring systems integrated into a tiered hazard framework was used in the 9-month study. The biomonitoring systems included a number of endpoints. The pH of the groundwater from well CC-27B was ≈4; thus, many of the assays were conducted at both pH 4 and pH 7. The toxicity at pH 7 was studied so that the data could be used, if necessary, in the Phase 2 hazard assessment of the groundwater as it enters the West Branch of Canal Creek which has pH values close to the neutral range.

Toxicity was detected at various groundwater concentrations by 6 of the 8 biomonitoring systems. The Ames assay for mutagenicity was negative in all cases for groundwater, West Branch of Canal Creek water, and filtered APG-EA tap water. Differences in Japanese medaka (Oryzias latipes) growth were found in a chronic 9-month histopathology assay when the fish were exposed to 1, 5 and 25% groundwater by volume diluted with either APG-EA dechlorinated tap water or West Branch of Canal Creek surface water. In general, the fish were smaller when grown in groundwater diluted with West Branch of Canal Creek water compared to those reared in groundwater diluted with APG-EA dechlorinated tap water. Most females were larger than males when reared in groundwater diluted with either West Branch of Canal Creek water or APG-EA dechlorinated tap water.

Experimental Pathology Laboratories, Inc. (EPL), Herndon, VA, analyzed the Japanese medaka in the chronic nine-month study

for incidences of hepatocellular neoplasia, neoplasms other than hepatocellular neoplasms, and non-neoplastic lesions and concluded the following. "...at nine months among male and female medaka there was no effect of groundwater on the incidence of hepatocellular neoplasia [at concentrations up to 25% groundwater by volume (highest concentrations studied) when APG-EA dechlorinated tap water was used as diluent water]." "At nine months among the males there was a slight effect of 25% groundwater concentration on the incidence of hepatocellular neoplasia...[and]...among the females there was no effect of groundwater exposure on hepatocellular neoplasia [when West Branch of Canal Creek water was used as diluent water for six months and dechlorinated tap water for three additional months]."

EPL found the following at the end of the nine-month study when Japanese medaka were initiated for 48 h at 13 days of age with 10 mg/L diethylnitrosamine (DEN). "At nine months there appeared to be a promotional effect of the groundwater at 25% concentration on hepatocellular neoplasia in male medaka (12 of 29 fish affected), although eight of 40 control medaka also had hepatocellular neoplasia at nine months [in fish exposed to 25% groundwater by volume diluted with APG-EA dechlorinated tap water]." "At nine months there appeared to be a trend of increasing percentage of hepatocellular neoplasms from controls in 25% groundwater, but the differences between groups in number of neoplasms was not great."

In DEN-initiated fish exposed to West Branch of Canal Creek water for six months followed by three months of exposure to groundwater in APG-EA dechlorinated tap water, EPL concluded "At nine months among male medaka there appeared to be a promotional effect of the groundwater on hepatocellular neoplasia based on the apparently low incidence of hepatocellular neoplasms in controls...This low incidence may be spurious..." "At six months among female medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasia. At six and nine months among female medaka there was no effect of the groundwater on hepatocellular neoplasia. The number of medaka with hepatocellular neoplasia increased at nine months over six months in all groups and at nine months the incidence was greatest among control Groups..."

The groundwater was acutely toxic at pH 4 to a green alga (Selenastrum capricornutum), cladoceran (Ceriodaphnia dubia), fathead minnow (Pimephales promelas), and Japanese medaka. From an acute toxicity standpoint, the groundwater appeared to be less toxic to the green alga at pH 7. The groundwater was not acutely toxic at pH 7 to the cladoceran, fathead minnow, or Japanese medaka.

The lowest concentration of groundwater that caused no observable adverse effect (NOEC; no-observed-effect

concentration) at pH 4, in the test systems in which the NOEC value could be determined, was 10% groundwater by volume. A NOEC of 10% groundwater by volume occurred in 3 out of 5 tests for the green alga (S. capricornutum); 4 out of 5 tests in both a 7-d cladoceran (C. dubia) and a 96-h frog (Xenopus laevis) embryo teratogenesis assay - Xenopus (FETAX). A NOEC of 18% groundwater by volume occurred in 2 of 5 tests in a 7-d fathead minnow (P. promelas) test. The groundwater was not toxic at pH 7 in the 7-d fathead minnow test and in 2 of 5 FETAX assays. The NOEC (18% groundwater by volume) was higher at pH 7 in 3 of the 5 FETAX assays. The 10% groundwater by volume NOEC for the green alga and cladoceran at pH 4, however, was essentially the same when the organisms were exposed to buffered groundwater at pH 7.

ACKNOWLEDGEMENTS

We thank Mr. Tommy R. Shedd (COR), Dr. Henry S. Gardner, and Dr. Robert A. Finch of the U.S. Army Center for Environmental Health Research (CEHR), Fort Detrick, Frederick, Maryland, for their continual support and help throughout the study. Mr. Alan B. Rosencrance of CEHR is acknowledged for conducting the munitions analyses. We thank Dr. Elgin S. Perry, statistical consultant, for conducting the analyses of the Japanese medaka growth data. Mr. Derek W. Cooper is acknowledged for his technical assistance during the project. We would also like to thank Mr. John G. Wrobel of the Environmental Preservation, Conservation and Restoration Division of the Directorate of Safety, Health and Environment, Aberdeen Proving Ground, MD for his help during the study. We acknowledge CEHR for supporting the study through U.S. Army Contract No. DAMD17-92-C-2066. This report is Scientific Article No. A7831, Contribution No. 9159 from the Maryland Agricultural Experiment Station.

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SECTION 1

INTRODUCTION

The prediction of potential adverse toxicological effects of contaminated groundwater to aquatic ecosystems is difficult because subsurface contamination is a highly complex environmental problem. The problem is compounded when multiple contaminants of different toxicological classes are present. To assess ecological hazards of contaminated groundwater, it is necessary to understand the fate, transport, and persistence of the contaminants present in the subsurface. A number of processes, such as hydrodynamic solute transport, abiotic, biotic, and multiphase flow, can affect the fate and mobility of contaminants in groundwater (Barbee, 1994; Knox et al., 1993).

The current study is an evaluation of the toxicity of contaminated groundwater at the West Branch of Canal Creek site located in the Canal Creek area of the U.S. Army Aberdeen Proving Ground-Edgewood Area (APG-EA), Aberdeen, MD. The groundwater in the West Branch of Canal Creek site is contaminated with multiple heavy metals and chlorinated aliphatic hydrocarbons (Lorah and Clark, 1992). In 1990, the Canal Creek area was placed on the National Priorities List established under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund). The U.S. Army and the U.S. Environmental Protection Agency Region III signed an Interagency Agreement in 1990 for remedial investigation/feasibility study (RI/RF) of the area in accordance with CERCLA and applicable state law. The West Branch of Canal Creek and its surrounding marshes are the major locations in the Canal Creek area at which contaminated groundwater is currently discharging to the aquatic environment (Oliveros and Vroblesky, 1989).

The toxicological evaluation of the West Branch of Canal Creek site groundwater contamination was designed to be conducted in two sequential phases. The primary objective of Phase 1 was a determination of the potential toxicity of the groundwater _in situ_. The Phase 1 study was conducted _in situ_ for two reasons. First, if the evaluation showed that the groundwater was not toxic, further hazard assessment studies of the groundwater discharge into the West Branch of Canal Creek ecosystem may not have been necessary. Secondly, if the evaluation showed that the groundwater was not toxic, treatment of the groundwater may not be necessary as a remedial action alternative to comply with CERCLA. If the _in situ_ study had not been conducted and the Phase 2 studies (briefly discussed below) showed that the West Branch of Canal Creek sediments were toxic, it would have been difficult to differentiate between toxicity derived from 1) groundwater only, 2) toxicity from other sources, such as, former APG-EA discharges, land runoff, air deposition, etc. (Lorah and

Clark, 1992) and 3) possible toxicity interactions of contaminants from the groundwater and other sources.

A secondary objective of Phase 1 was to evaluate, where test systems were appropriate for use in low salinity waters, the potential toxicity of West Branch of Canal Creek water. The West Branch of Canal Creek studies were conducted concurrently with the in situ studies to obtain background data on the potential toxicity of the creek water. Only aqueous phase assays were used in the water column studies of West Branch of Canal Creek water; no sediment systems were studied.

Phase 2, an evaluation of the potential toxicity of the sediments impacted by the contaminated groundwater "plume" as it moves through the marsh and bottom sediments into West Branch of Canal Creek, was to be implemented if the groundwater proved to be toxic. As discussed in this report, several Phase 1 biomonitoring systems detected toxicity in the groundwater; thus, preliminary sediment studies for Phase 2 have been initiated. The results of the Phase 1 study will be integrated with the Phase 2 results and other pertinent data to derive a preliminary hazard assessment of the groundwater discharge into West Branch of Canal Creek. The Phase 2 studies and analyses will be given in a separate report.

As stated above, the objective of Phase 1 was to evaluate the potential toxicity of the groundwater in situ to aquatic organisms because it was known that the groundwater enters the West Branch of Canal Creek ecosystem. Although microorganisms are the primary organisms present in most subsurface environments, an array of surrogate biomonitoring systems integrated into a tiered hazard framework was used in the evaluation. The tiered hazard assessment approach was similar to that used in a hazard assessment evaluation of the contaminated surficial aquifer at APG-EA's Beach Point Peninsula (Burton et al., 1994). The array of biomonitoring assays, which covered several levels of biological complexity, was selected to maximize the predictability of potential adverse pollutant effects to aquatic organisms (Dutka and Kwan, 1988; National Research Council, 1981; Schaeffer and Janardam, 1987).

SECTION 2

OBJECTIVES OF STUDY

The primary objectives of the study were to:

1) Evaluate the acute toxicity of the groundwater using the 96-h EC50 algal (Selenastrum capricornutum) growth test, 48-h LC50 cladoceran (Ceriodaphnia dubia) assay, 96-h LC50 fathead minnow (Pimephales promelas) assay, and 96-h LC50 Japanese medaka (Oryzias latipes) assay. In addition, possible temporal changes in the acute toxicity of the groundwater were quantified using the 5- and 15-min Microtox® procedure (Photobacterium phosphoreum bioluminescent activity).

2) Evaluate the chronic toxicity of the groundwater using the 96-h EC50 algal (S. capricornutum) growth test, 7-d cladoceran (C. dubia) survival and reproduction test, and 7-d fathead minnow (P. promelas) survival and growth test.

3) Determine the genotoxicity potential of unconcentrated and concentrated samples of the groundwater using the Ames assay.

4) Determine the developmental toxicity potential of the groundwater using the frog (Xenopus laevis) embryo teratogenesis assay - Xenopus (FETAX).

5) Determine the chronic histopathological potential of the groundwater using a 9-month Japanese medaka (O. latipes) growth and chronic histopathology test.

6) Quantify the major chemicals present in the groundwater and monitor the general water quality of the groundwater.

7) Determine toxicity at pH 7, where appropriate, so that the data could be used, if necessary, in the Phase 2 hazard assessment of the groundwater as it enters the West Branch of Canal Creek.

The secondary objectives of the study were to evaluate the potential toxicity of West Branch of Canal Creek water using the above biomonitoring systems which were appropriate for use in low salinity water. The following evaluations were conducted:

1) Evaluate the acute toxicity of West Branch of Canal Creek water using the 96-h LC50 Japanese medaka assay. Evaluate the possible acute toxicity and temporal changes in the acute toxicity of West Branch of Canal Creek water using the 5- and 15-min Microtox® procedure.

2) Determine the genotoxicity potential of unconcentrated and concentrated samples of West Branch of Canal Creek water using the Ames assay.

3) Determine the chronic histopathological potential of the West Branch of Canal Creek water using the 9-month Japanese medaka growth and chronic histopathology test.

4) Quantify the major chemicals present in the West Branch of Canal Creek water and monitor the general water quality of the West Branch of Canal Creek water.

SECTION 3

WEST BRANCH OF CANAL CREEK SITE DESCRIPTION

The West Branch of Canal Creek is located in the Canal Creek area of the U.S. Army Aberdeen Proving Ground-Edgewood Area (APG-EA), Aberdeen, MD. As discussed in Section 3.3, West Branch of Canal Creek and its surrounding marshes are the major locations in the Canal Creek area at which contaminated groundwater is currently discharging. The studies described in Phase 1 of this report were conducted with contaminated groundwater obtained from the U.S. Geological Survey's (USGS) contaminant fate and mobility study site located in the West Branch of Canal Creek study area. Preliminary Phase 2 sediment studies (results to be given in a separate report) are being conducted with contaminated sediment also obtained from the USGS's contaminant fate and mobility study site. The USGS's West Branch of Canal Creek contaminant fate and mobility study site is bounded approximately on the northeast by Hanlon Street, southwest by West Branch of Canal Creek marshes, southeast by 35th Street, to approximately 200 m southwest of Hanlon Street. Site description data for the Canal Creek area will be discussed where appropriate for the West Branch of Canal Creek study site.

3.1 Geographic Setting and Land Use

The Canal Creek area is bordered by the Bush River and Gunpowder River which both drain to the Chesapeake Bay. Lauderick Creek and Kings Creek discharge to the Bush River on the eastern boundary of the area. The East and West Branches of Canal Creek, which provide surface drainage for a major part of the Canal Creek area, flow into the Gunpowder River on the western boundary (Lorah and Vroblesky, 1989).

Canal Creek, which provides surface drainage for a major part of the Canal Creek area, drains a land surface of more than 1,215 ha (~3,000 acres) (Lorah and Clark, 1992). The creek is tidally influenced; tidal ranges vary from about 0.15 to 0.46 m (≈0.5 to 1.5 ft) depending on the location. Wading birds, ducks, shorebirds, frogs, and muskrat can be seen in the wetland areas of Canal Creek. The creek supports a variety of freshwater and estuarine aquatic life. Marshes, which are classified as estuarine, emergent, irregularly flooded wetlands, surround West Branch of Canal Creek. The land immediately surrounding the West Branch consists of tall marsh vegetation, including grasses, sedges, cattails, Phragmites, arrowhead, and pickerelweed (Lorah and Clark, 1992). A detailed description of the plant communities associated with West Branch of Canal Creek is given in ICF Kaiser (1995).

3.2 Hydrogeology

The geology of the Canal Creek area has been described by USGS (Oliveros and Vroblesky, 1989). Briefly, the Aberdeen Proving Ground-Edgewood Area is underlain by Coastal Plain sediments consisting of unconsolidated clay, silt, and sand layers with occasional gravel lenses. The Coastal Plain sediments dip southeastward, increasing to a thickness of ≈400 ft in the eastern part of the Canal Creek area. Three aquifers and two confining units are present in most of the Canal Creek area as follows: 1) the surficial aquifer; 2) the upper confining unit; 3) the Canal Creek aquifer; 4) the lower confining unit; and 5) the lower confined aquifer.

The Canal Creek aquifer is the major aquifer underlying most of the Canal Creek area with a thickness ranging from 9.1 to 21.3 m (30 to 70 ft). As discussed by Lorah and Clark (1992), the aquifer is unprotected by a surficial clay layer where the upper confining unit is absent. The upper confining unit is absent in two areas that extend approximately parallel to the present courses of the East and West Branches of Canal Creek (Lorah and Clark, 1992). Near the West Branch of Canal Creek, the upper confining unit and Canal Creek aquifer begin to outcrop, leaving the Canal Creek aquifer exposed to the surface. That is, a direct hydraulic connection exists between the surficial aquifer and the Canal Creek aquifer near the West Branch of Canal Creek because of the absence of the upper confining unit. This part of the Canal Creek aquifer has been designated "unconfined" by Oliveros and Vroblesky (1989).

A Pleistocene paleochannel eroded the sediments of the upper confining unit near the East Branch of Canal Creek. As a result, the sediments of the Canal Creek and surficial aquifers are directly connected. The Canal Creek aquifer becomes truly confined east and south of the paleochannel where the aquifer dips approximately 15.2 m per 1,609 m (50 ft/mile) under the thickening upper confining unit. The upper confining unit is over 100 ft thick in the extreme southeastern part of the Canal Creek area.

The surficial aquifer (0 to 9.1 m; 0 to 30 ft), which overlies the Canal Creek aquifer, becomes discontinuous and pinches out east and northeast of the paleochannel (Lorah and Clark, 1992). Isolated portions of the surficial aquifer are present south of Kings Creek and at Beach Point. The lithology of the surficial aquifer is highly variable. The lower confining unit and lower confined aquifer underlie the Canal Creek aquifer. The lower confining unit has a thickness of 10.7 to 19.8 m (35 to 65 ft). The lower confined aquifer appears to be continuous over the entire Canal Creek area.

3.3 Groundwater Flow

The Canal Creek aquifer contains two separate flow systems: one unconfined and part of the local flow system, and one confined and part of the regional flow system (Oliveros and Vroblesky, 1989). The local flow system occurs where the upper confining unit is absent near the West Branch of Canal Creek and the paleochannel near the East Branch of Canal Creek. Groundwater in the local flow system of the Canal Creek aquifer discharges vertically upward to the surficial aquifer or directly to the surface-water bodies, whereas groundwater in the regional flow system moves southeast and dips down into the deeper confined flow system (Lorah and Clark, 1992). Equipotential mapping of the Canal Creek aquifer shows that the groundwater divide between the eastward and westward flowing portions of the Canal Creek aquifer runs ≈ 1,400 m (4,700 ft) in a north south direction from the Route 24 entrance of the Edgewood Arsenal (approximately parallel to Hoadley Road) to approximately the same latitude as the confluence of the East and West Branches of Canal Creek (JEG, 1995).

Although the hydraulic heads in the Canal Creek aquifer show characteristics of local flow conditions near both branches of Canal Creek, the aquifer is most strongly influenced by the presence of the West Branch of Canal Creek because the aquifer is largely unconfined near this creek branch (Lorah and Clark, 1992). As discussed by Lorah and Clark (1992), the upper part of the Canal Creek aquifer at sites located near the West Branch of Canal Creek has been hydrologically defined as the "surficial aquifer" because it behaves as a water table aquifer. Near the West Branch of Canal Creek, hydraulic head distributions in this water table aquifer are very similar to the heads measured in wells screened in the lower part of the Canal Creek aquifer. Large bends in the hydraulic head contours around the West Branch of Canal Creek indicate that groundwater in both the lower and upper parts of the Canal Creek aquifer flows toward and discharges to the West Branch of Canal Creek. Some groundwater flow also occurs toward the East Branch of Canal Creek near the junction of both branches of Canal Creek. Groundwater flow in the Canal Creek aquifer near the West Branch of Canal Creek is also affected by drainage into a network of leaky sewers and storm drains (Oliveros and Vroblesky, 1989).

The Canal Creek aquifer receives recharge from three sources: 1) downward flow from the surficial aquifer; 2) upward recharge from the lower confined aquifer; and 3) precipitation infiltrating to the aquifer from updip, west and north of the Canal Creek area (Oliveros and Vroblesky, 1989). Recharge from the surficial aquifer occurs in several areas that contain a number of former activities which may have contributed to contamination; thus, the Canal Creek aquifer is more susceptible to contamination in these recharge areas (Lorah and Clark, 1992).

The surficial aquifer receives recharge from direct infiltration of precipitation or surface water and from upward leakage from the Canal Creek aquifer (Lorah and Clark, 1992). Direct infiltration can occur over most of the aquifer surface. As discussed by Lorah and Clark (1992), the surficial aquifer discharges to surface water, to leaky sewers and storm drains, and to the Canal Creek aquifer. Much of the downward discharge from the surficial aquifer to the Canal Creek aquifer probably returns as recharge to the surficial aquifer at topographic lows; however, some may enter the regional flow system of the Canal Creek aquifer and move to the southeast to discharge off-site.

Present water level fluctuations in the Canal Creek area are caused by rainfall and tidal effects (Lorah and Clark, 1992). At any given site, the maximum seasonal fluctuation in water levels observed in the Canal Creek aquifer is 0.6 to 0.9 m (2 to 3 ft). Seasonal changes in hydraulic heads in the Canal Creek aquifer are most pronounced in the unconfined parts of the aquifer. Hydrograph recordings from a well screened in the unconfined Canal Creek aquifer near the West Branch of Canal Creek show a rise in water levels generally during the spring when rainfall and recharge are greatest; a decline in water levels generally occurs in the late summer to early fall when rainfall is the least.

In the surficial aquifer, seasonal differences in head are greatest in relatively shallow, hydrologically isolated parts of the aquifer located east of the East Branch of Canal Creek (Lorah and Clark, 1992). Seasonal differences in head as high as 1.7 m (5.5 ft) have been recorded in the surficial aquifer. Seasonal fluctuations in the lower confined aquifer generally are less pronounced than those in the Canal Creek aquifer or surficial aquifer. Groundwater flow directions in the three aquifers do not vary significantly over the Canal Creek area because of seasonal fluctuations. Pumping stresses do not currently affect groundwater flow within the Canal Creek area (Lorah and Clark, 1992).

3.4 Historical Use

The Canal Creek area has been used for a number of activities which may have contributed to the contamination of the soils, groundwater, and marshes of the creeks (Nemath, 1989). Nemath (1989) has discussed in detail the major activities which were known to have occurred since 1917 in the Canal Creek area. The activities included manufacturing, filling of munitions, and waste disposal. Lorah and Vroblesky (1989) summarized Nemath's report of past activities and briefly discussed those plants and activities that are believed to have had the greatest potential for environmental impact. The following is a brief summary taken primarily from Lorah and Vroblesky (1989).

Five major production-scale activities occurred at Canal Creek. They included the manufacturing of chlorine, mustard (primarily sulfur mustard), chloroacetophenone, impregnite material [N,N'-dichloro-bis-(2,4,6-trichlorophenyl)urea], and the impregnating of protective clothing. The plants were most active during World Wars I and II. Pilot, or experimental, manufacturing was performed to gather data on manufacturing processes in support of the larger production-size activities. Munitions filling operations have been conducted from 1918 to the present. Other activities that also may have affected the environment include the operation of machine and maintenance shops, motorpool garages, and the airfield.

The primary method of waste disposal from WWI until recently was by discharge to sewer systems. As discussed by Lorah and Vroblesky (1989), the sewer lines from the majority of the manufacturing and munitions filling plants discharged to the East or West Branches of Canal Creek. Exceptions include a pilot plant east of the airport, which discharged to Kings Creek, and the mobile clothing-impregnating units that operated at Beach Point, which discharged to the Bush River and Kings Creek. Solid wastes, such as, sludges and tars, were discharged through the sewers if the wastes could be thinned with water or held at elevated temperatures to keep them fluid.

Wastes generally received little or no treatment prior to discharge before and during WWII (Lorah and Vroblesky, 1989). Wastes that could not be discharged through the sewer systems were often dumped into the marshy areas along Canal Creek. A number of disposal pits, a sand pit, salvage yard, and a fire-training pit were used throughout Canal Creek for various operations. Waste treatment increased after WWII with the increased awareness of environmental concerns and regulations.

Organic solvents, such as carbon tetrachloride, 1,1,2,2-tetrachloroethane, and trichloroethylene, were some of the most common wastes produced in large quantities from the manufacturing, munitions filling, and other miscellaneous activities in the Canal Creek area (Lorah and Vroblesky, 1989). All the major manufacturing plants, except for the chlorine plants, used solvents as raw materials, decontaminating agents, and cleaning agents. A number of heavy metals were used in various processes but in much smaller quantities than the organic solvents (Nemath, 1989).

3.5 Groundwater Contamination

Few studies of groundwater contamination were conducted prior to 1985 in the Canal Creek area (Nemath, 1989, Lorah and Vroblesky, 1989). The USGS initiated a 5-year study in 1985 to determine the extent of groundwater contamination in the Canal Creek area (Lorah and Clark, 1992). The observation well network

that was established in the Canal Creek area included 87 wells installed during the first phase of the study and 65 wells installed during the second phase to further define the extent and sources of contamination. The observation wells were installed at a total of 77 sites that generally consist of clusters of two to six wells screened at different depths; only one well was placed at some sites. The sites were chosen on the basis of historical information regarding chemical manufacturing and waste disposal areas. The wells were screened in the three major aquifers with the majority of the wells screened in the Canal Creek aquifer.

A number of well sites were established near West Branch of Canal Creek (Lorah and Clark, 1992). Approximately 24 sites were established in the first-phase of drilling followed by an additional 12 sites in the second phase. A detailed description of the suspected sources near West Branch of Canal Creek and the well sites are given in Lorah and Clark (1992); thus, the information will not be repeated in this report.

Chemical monitoring (inorganic and organic constituents) by USGS confirmed that hazardous chemicals from prior activities were widespread in the surficial and Canal Creek aquifers (Lorah and Clark, 1992). No contamination was detected in the lower confined aquifer, which is protected by a clay unit that underlies the Canal Creek aquifer. Fifteen inorganic constituents were present in the surficial aquifer in concentrations that exceed current or proposed drinking water regulations established by the U.S. Environmental Protection Agency (EPA). They included dissolved solids, chloride, iron, fluoride, manganese, aluminum, antimony, arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, and thallium. In addition, copper and zinc were present in groundwater in elevated concentrations compared to background concentrations in the study area (Lorah and Clark, 1992).

Chlorinated volatile organic compounds were the dominant groundwater contaminants and included 1,1,2,2-tetrachloroethane, trichlorethylene, chloroform, 1,2-trans-dichloroethylene, and carbon tetrachloride (Lorah and Clark, 1992). Additional volatile organic compounds included benzene, chlorinated benzenes, pentachloroethane, and several unknown compounds. Semi-volatile organic contaminants were not as widely distributed in the groundwater as the volatile compounds. Nitrobenzene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, and two mustard degradation products (dithiane and 1,4-oxathine) were present at three or fewer sites. Other semi-volatile contaminants that were reported (tentatively identified) in some samples include hexachloroethane, 1,2-dibromoethene, tribromethane, naphthalene, various compound related to petroleum fuels, and unknown compounds (Lorah and Clark, 1992).

3.6 Sediment Contamination

The contaminants present in the sediments of Canal Creek have been investigated by ICF Kaiser (1995). A total of 14 sediment samples were taken from Canal Creek and analyzed for inorganic and organic contaminants and toxicity to an aquatic organism. Five samples were taken from West Branch of Canal Creek; five from East Branch of Canal Creek; and four below the confluence of the West and East Branches of Canal Creek. Most of EPA's priority pollutant heavy metals (selenium and thallium were not measured) were found in the sediments of all 14 stations with the exceptions of cadmium which was present at 9 of 14 stations, nickel at 11 of 14 stations, and silver at 7 of 14 stations. Cadmium, mercury, and zinc were judged by ICF Kaiser (1995) to be inorganic chemicals of potential concern which may impact benthic organisms. Cadmium was found at concentrations to be judged a chemical of concern in West Branch of Canal Creek sediment taken from the current study site.

A number of organic contaminants were also found in the sediments at one or more of the 14 stations sampled during the ICF Kaiser (1995) study. The following organic chemicals of concern were found at the highest concentrations of the 14 stations in the sediments taken from the West Branch of Canal Creek study site: pesticides/aroclors (Aroclor-1260, α-BHC, dieldrin, and endosulfan I); polycyclicaromatic hydrocarbons (phenanthrene); explosives [N,N-bis(2,4,6-trichlorophenyl)urea and nitroglycerin]; and other volatiles/semi-volatiles (1,2,4-trichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,6-trichlorophenol, 4-chloroaniline, and pentachlorophenol).

Twenty-eight day chronic toxicity tests were conducted with the amphipod, _Hyalella azeteca_, to determine the potential toxicity of the Canal Creek sediments to benthic organisms (ICF Kaiser, 1995). Significant mortality occurred to amphipods at two of the 14 stations in Canal Creek; significant reductions in growth occurred at a third station. Significant mortality occurred in West Branch of Canal Creek sediment taken from the current study site and at one station at the confluence of West and East Branches of Canal Creek. Growth was significantly reduced at one station in East Branch of Canal Creek. ICF Kaiser (1995) concluded that the biological effects occurred at chemical "hot spots", that is, the observed reductions in survival and growth occurred in sediments where high chemical concentrations were detected.

3.7 Surface Water Contamination

The contamination of Canal Creek surface waters was also studied during the 5-year USGS study initiated in 1985 (Lorah and Clark, 1992). Surface water samples were collected from the West and East Branches of Canal Creek, at the mouth of the Gunpowder

River, and from the area that borders Beach Point in Kings Creek and the Bush River. Most of the surface water sampling sites were located where contaminated groundwater was most likely to discharge and near past sewerline discharge points in the Canal Creek area. Sampling sites were most heavily concentrated along the West Branch of Canal Creek and around Beach Point because preliminary data indicated that many sources of shallow contaminated groundwater and wastewater existed in these areas.

Five inorganic constituents were found in surface water samples that were collected from West Branch of Canal Creek in concentrations that exceed EPA's acute or chronic aquatic life criteria for freshwater organisms. The five inorganic contaminants included cadmium, iron, lead, mercury, and zinc. According to Lorah and Clark (1992), a major source of the inorganic contaminants may be the remobilization of metals that accumulated in bottom sediments from the discharge of untreated industrial wastewaters.

The same volatile organic compounds that were the major groundwater contaminants were detected in surface water samples. The discharge of shallow contaminated groundwater is probably the major source of the surface water contaminants (Lorah and Clark, 1992). According to Lorah and Clark (1992), dissolution of dense non-aqueous phase liquids (DNAPL) that are still present in the bottom sediments may be a likely source of the volatile organic contaminants found in the surface waters. Phthalate esters, which are common laboratory contaminants, were the only organic compounds detected in the surface water samples in concentrations that exceeded either acute or chronic ambient water quality criteria for freshwater aquatic life.

SECTION 4

MATERIALS AND METHODS

4.1 General

Groundwater was withdrawn from well CC-27B (Harford County Permit No. HA-81-3062) which is one of two of the most highly contaminated wells at the West Branch of Canal Creek site (Lorah and Clark, 1992). The well is 12.2 m deep (40 feet) and has a screened interval of 10.7-12.2 m (35-40 ft). The well pump intake was located at 11.3 m (37 feet). Groundwater was pumped continuously from the well at a rate of ≈7.5 L/min (2 gal/min).

Several components of the biomonitoring study were conducted on-site (see below) in an aquatic biomonitoring trailer with bioassay capabilities similar to a CEHR trailer described by Herriott and Burton (1992). Two sources of dilution water were used in the studies. The first was APG-EA potable drinking which was charcoal filtered, aerated before use, and adjusted to ≈25 °C as described in Herriott and Burton (1992). The second source was surface water pumped from the West Branch of Canal Creek. A stainless steel pump, which was placed in a PVC pipe housing (25.4 cm O.D.; 10 inches) in the creek to protect the pump from floating debris, supplied ≈7.5 L/min (≈ 2 gal/min) to the biomonitoring trailer. The creek water was filtered at ≈80 μ before use. Groundwater, West Branch of Canal Creek water, and APG-EA tap water were supplied to the trailer via polyethylene pipe. Excess groundwater, creek water, and tap water from the trailer were collected, treated via charcoal, and discharged to the APG-EA Wastewater Treatment Plant collection system.

An array of 8 biomonitoring systems were evaluated during the 9-month study which ran from August 15, 1994 to May 10, 1995. The biomonitoring systems included a number of endpoints. A brief summary of the biomonitoring tests conducted and the dates of the studies is given in Table 1. The pH of the groundwater from well CC-27B was ≈4; thus, many of the assays were conducted at both pH 4 and pH 7. The toxicity at pH 7 was studied so that the data could ultimately be used in a hazard assessment of the groundwater as it enters the West Branch of Canal Creek which generally has a pH in the low neutral range.

Although microorganisms are the primary organisms present in most subsurface environments, an array of surrogate biomonitoring systems integrated into a tiered hazard framework was used in the groundwater evaluation. The array of biomonitoring assays covered several levels of biological complexity to maximize the predictability of potential adverse pollutant effects to aquatic organisms. Although the groundwater ultimately discharges into the West Branch of Canal Creek, freshwater surrogate

TABLE 1. SUMMARY OF THE BIOMONITORING TESTS CONDUCTED[a]

Test and/or Species	Type of Test	Test No.	Test Periods
Microtox® (bacterium)	5- and 15-min EC50	N/A	08/15/94 - 05/10/95
Green alga	96-h EC50; 96-h Growth	1	09/13/94 - 09/17/94
		2	11/11/94 - 11/15/94
		3	01/24/95 - 01/28/95
		4	03/24/95 - 03/28/95
		5	05/03/95 - 05/07/95
Cladoceran	48-h LC50; 7-d Survival and reproduction	1	09/13/94 - 09/20/94
		2	11/08/94 - 11/15/94
		3	01/24/95 - 01/31/95
		4	03/24/95 - 03/31/95
		5	05/03/95 - 05/10/95
Fathead minnow	96-h LC50; 7-d Survival and growth	1	09/13/94 - 09/20/94
		2	11/08/94 - 11/15/94
		3	01/24/95 - 01/31/95
		4	03/24/95 - 03/31/95
		5	05/03/95 - 05/10/95
Japanese medaka	96-h LC50	1	10/11/94 - 10/15/94
		2	12/12/94 - 12/16/94
		3	02/06/95 - 01/10/95
		4	04/07/95 - 04/11/95
		5	05/08/95 - 05/12/95
Genotoxicity (bacterium)	Ames assay	1	09/12/94
		2	11/07/94
		3	01/23/95
		4	03/23/95
		5	06/07/95
Developmental toxicity (African clawed frog)	4-d FETAX	1	09/16/94 - 09/20/94
		2	11/11/94 - 11/15/94
		3	01/25/95 - 01/29/95
		4	03/24/95 - 03/28/95
		5	05/03/95 - 05/07/95
Chronic histopathology and growth (Japanese medaka)	6-m exposure	N/A	08/12/94 - 02/08/95
	9-m exposure	N/A	08/12/95 - 05/10/95

TABLE 1. (CONTINUED)

Test and/or Species	Type of Test	Test No.	Test Periods
Comprehensive chemical analyses	N/A	1	09/12/94
		2	11/07/94
		3	01/23/95
		4	03/23/95
		5	05/02/95
Munitions analyses	N/A	1	09/16/94
		2	11/09/94
		3	01/23/95
		4	04/21/95
		5	04/28/95
Routine water quality analyses	N/A	N/A	Daily/weekly

[a] See Section 4 for a description of the test method, various media sampled, types of samples taken, etc., for each test system.

biomonitoring systems were used in the evaluation because the groundwater was freshwater. An argument can be made that low saline organisms should also have been included because the West Branch of Canal Creek is a freshwater/low salinity system influenced primarily by tidal flux and rainfall. However, as stated in the Introduction, the primary goal of the groundwater study was to evaluate the toxicity of the groundwater <u>in situ</u>. Thus, low salinity organisms were not included in the biomonitoring array.

In addition to the groundwater studies, several studies were conducted to determine the potential toxicity of West Branch of Canal Creek water. Only those test systems that were appropriate for use in low salinity waters were used in the evaluation. Aqueous phase assays were used in the water column studies of West Branch of Canal Creek water; no sediment systems were studied.

The experimental procedures and frequency of each assay are described in detail below. The following is a brief description of the tier of biomonitoring systems employed in the evaluation. Acute toxicity of the groundwater was evaluated three times each week using the 5- and 15-min Microtox® assay which uses microbial (<u>Photobacterium phosphoreum</u>) bioluminescent activity. In addition to providing rapid toxicity data, the test was also

conducted to monitor the toxicity of the groundwater over time. Acute toxicity data were also obtained for the Japanese medaka (Oryzias latipes) and the algal, invertebrate, and fish used in the short-term toxicity tests described in Section 4.2 below. The algal, invertebrate, and fish assays were conducted five times on a bimonthly basis during the course of the study at a pH of 4 and 7.

The following 4- to 7-d short-term toxicity tests, which were used to estimate chronic toxicity, were performed on a bimonthly basis: 96-h algal (Selenastrum capricornutum) growth test; 7-d cladoceran (Ceriodaphnia dubia) survival and reproduction test; and 7-d fathead minnow (Pimephales promelas) survival and growth test. Five bimonthly tests were conducted with each species at pH 4 and pH 7. In addition to the short-term methods used to estimate chronic toxicity, growth data at 6 and 9 months from the chronic Japanese medaka histopathology test described below were also used as chronic toxicity endpoints.

Gene mutation potential was determined using the Ames Salmonella/mammalian-microsome reverse assay. Developmental toxicity was determined by the 96-h frog embryo teratogenesis assay-Xenopus (FETAX) using the African clawed frog, Xenopus laevis. Genotoxicity and developmental toxicity assays were conducted at bimonthly intervals during the same periods as the above acute and short-term chronic tests were conducted. Chronic histopathological changes were evaluated using the Japanese medaka as the experimental model. Both unexposed and fry exposed to diethylnitrosamine (DEN) were exposed continuously under flow-through test conditions for 6- and 9-month exposure periods. Identical exposures were performed using both APG-EA tap water and West Branch of Canal Creek water as diluent water sources.

Comprehensive chemical analyses of the raw groundwater, filtered APG-EA tap water, West Branch of Canal Creek water, and test dilutions in the chronic histopathology assay were performed five times at bimonthly intervals. The chemical analyses were conducted during the same periods that the above bimonthly assays were conducted. Routine water quality analyses were also conducted at various frequencies on a weekly basis.

4.2 Acute Toxicity Tests

4.2.1 Microtox®

The Microtox® test (Microbics Corp., Carlsbad, CA) is a rapid acute toxicity test that may be completed in less than one hour. The test is based on the reduction in bioluminescence of the marine bacterium P. phosphoreum when exposed to a sample of unknown toxicity. The degree of light reduction, an indication of metabolic inhibition in the test preparation, indicates the degree of toxicity of the sample. The Microtox® test procedures

followed were those outlined in Herriott and Burton (1992) which were derived from Microtox®'s operating manual (Microtox®, 1988). A Microtox® Model 500 Analyzer with PC version 6.3 software was used for both a 5-min and 15-min test on all samples.

Several sources of water were assayed on-site over the 9-month test period. With the exception of two samples, all samples were composite grab samples taken from the 9-month histopathology exposure tanks as described in Section 4.6. Grab samples were taken directly from the groundwater supply line and the West Branch of Canal Creek (special 2-month volatile organics study described below) water supply line as they entered the biomonitoring facility. The West Branch of Canal Creek samples taken from the 9-month histopathological exposure aquaria were composite grab samples (see below). All assays were conducted three times per week with the exception of the APG-EA tap water and West Branch of Canal Creek supply water volatile organics study which were assayed weekly as described below.

The following Microtox® assays were conducted three times a week from August 15, 1994 until the biomonitoring study was completed on May 10, 1995. Both 5- and 15-min assays were conducted on 100% groundwater, 25% groundwater by volume diluted with APG-EA tap water, and 100% West Branch of Canal Creek water. The 25% groundwater by volume samples were composite grab samples taken from the chronic histopathology study tanks as described below in Section 4.6. A 25% groundwater by volume composite grab sample taken from the chronic histopathology study tanks diluted with West Branch of Canal Creek water was scheduled to be taken throughout the 9-month exposure period. However, as explained in Section 4.6, the assays were discontinued after six months (February 5, 1995), because the diluent water was switched from West Branch of Canal Creek water to APG-EA tap water.

Five- and 15-min assays were conducted three times per week for ≈1.5 months (August 15, 1994 to October 5, 1994) on 5 and 1% groundwater by volume samples taken from the 9-month histopathology tanks diluted with both APG-EA tap water and West Branch of Canal Creek water (Section 4.6). The assays were terminated after ≈1.5 months because no toxicity was observed. Weekly assays were conducted for two months (September 2, 1995 to November 5, 1994) on grab samples of 100% West Branch of Canal Creek water taken directly from the fed line as it entered the biomonitoring trailer. These assays were conducted to determine whether or not trace volatile organics in West Branch of Canal Creek water were present at concentrations high enough to cause toxicity before possible volatilization occurred in the 100% control West Branch of Canal Creek histopathology aquaria (Section 4.6). The assays were discontinued after two months of study because no toxicity was detected in the raw West Branch of Canal Creek water.

Standard 5- and 15-min Microtox® assays were conducted once per week on grab samples of 100% APG-EA tap water during the 9-month test period. A previous study of charcoal filtered APG-EA tap water showed that no toxicity existed in the tap water (Burton et al., 1994). Thus, only weekly samples rather than three samples per week were assayed to confirm the earlier finding. Five- and 15-min assays of raw groundwater buffered with 10 N NaOH to a pH of ≈7 were run for 9-months to determine the effect of pH on the toxicity observed for raw 100% groundwater at a pH of ≈4.

4.2.2 Green Alga, Cladoceran, Fathead Minnow, and Japanese Medaka

Acute toxicity values were calculated where possible at pH 4 and 7 for the green alga, cladoceran, and fathead minnow from the data obtained during the short-term chronic tests described in Section 4.3. With regard to the green alga, EPA's Office of Research and Development considers the 96-h algal test for growth to be a short-term chronic test for determining the toxicity of effluents (Horning and Weber, 1985; Weber et al., 1989) as do other investigators for evaluating single chemicals (for ex., see Hughes et al., 1988 and Suter, 1993). EPA's Toxic Substance Control Act office considers the 96-h test to be an acute test (U.S. EPA, 1985 and 1986a). Because we used the short-term chronic method (Section 4.3.1), we analyzed the data as chronic data; however, we also analyzed and reported the results as 96-h acute data so that acute:chronic ratios could be calculated, if needed, for later use in a hazard assessment. Forty-eight-h LC50s and 96-h LC50s were determined where possible for the cladoceran and fathead minnow, respectively.

Five bimonthly 96-h static renewal acute toxicity tests were conducted on-site at 25 °C with the Japanese medaka at a pH of 4 and 7 using the procedure of Weber (1991). All dilutions were renewed daily with groundwater obtained just prior to the renewal. In addition to the 96-h LC50 bioassays using APG-EA tap water as the dilution water, 2 replicates of 10 fish/replicate were exposed to 100% West Branch of Canal Creek water (static renewal every 24 h). The West Branch of Canal Creek exposure was conducted to provide additional supporting data for the long-term exposure of Japanese medaka to West Branch of Canal Creek diluent water discussed in Section 4.6. Routine water quality was taken at the beginning and end of each 24-h renewal. The methods used for the chemical analyses are discussed in Section 4.7.2.

4.3 Short-term Chronic Toxicity Tests

The specific test methods for the short-term chronic tests are given below. Deviations from the test methods are discussed where appropriate. A geometric series of five groundwater concentrations (plus controls) was used in all tests. The

groundwater samples used in the tests were obtained daily and used within 6 h at each 24-h renewal (see below). All groundwater samples were transported in glass containers on ice and held at 4°C until used for the tests. Each groundwater sample was split into two aliquots. One aliquot was maintained at pH 4 and the second buffered to pH 7 (10 N NaOH). All five bimonthly short-term chronic bioassays were conducted at pH 4 and 7. The same pH-adjusted aliquots were also used for the FETAX assays discussed in Section 4.5. In addition to the standard bioassays with groundwater, a 100% APG-EA tap water sample was run concurrently with each short-term chronic test to provide supporting toxicological data for the APG-EA tap water used in the chronic histopathology exposures (Section 4.6). All bioassays were conducted at the University of Maryland Wye Research and Education Center (UMD/WREC) Aquatic Toxicology Laboratory.

4.3.1 Green Alga

The short-term chronic toxicity of the groundwater to the green alga (S. capricornutum) at pH 4 and 7 (10 N NaOH) was determined five times by the EPA procedures given in Weber et al. (1989). A starter culture of S. capricornutum was obtained from the culture collection at the University of North Texas, Denton, TX. Stock algal cultures were reared in 2.5 L Pyrex culture flasks containing 1 L of sterilized double strength "AAP" algal assay medium, with sufficient P added to achieve a 20:1 N:P ratio as described in Miller et al. (1978). Cultures were maintained in a constant temperature incubator under constant cool-white fluorescent lights (≈300 foot candles) at a temperature of 25 ± 0.2°C on a shaker table oscillating at 100 rpm (± 10 %). Log growth cells were used to start all tests.

Algal test solutions were prepared by dilution of the groundwater with filtered sterilized assay media. Test solutions (100 mL total volume) were dispensed into 250 mL Delong flasks and inoculated with S. capricornutum cells in log growth to achieve a density of ≈1 x 10^4 cells/mL. Triplicates were prepared for each treatment. The flasks were placed on a shaker table in an incubator set at the culturing conditions described above. Growth measurements (cell density) were made from all replicates in each treatment at 0, 24, 48, 72, and 96 h. Algal cell density was determined from a 1 mL sample with a Model ZBI Coulter Counter (Coulter Electronics, Inc., Hialeah, FL). The instrument was calibrated with each use via hemocytometer counts. Test solutions were not renewed during the 96-h studies.

4.3.2 Cladoceran

The chronic toxicity of the groundwater at pH 4 and 7 to C. dubia was determined five times by the EPA static renewal method (solutions renewed daily) given in Weber et al. (1989). The

cladoceran was cultured at 25 ± 1°C in 600 mL glass beakers filled with 400 mL of 20% Perrier:80% reverse osmosis water amended with selenium (2 µg Se/L as Na_2SeO_3) as recommended by Winner (1989). The diet consisted of a mixture of Cerophyl® (Cerophyl Laboratories, Inc., Kansas City, MO) and the green alga, S. capricornutum, added to the cladoceran culture to achieve final concentrations of 120 µg Cerophyl®/mL and 6.7 x 10^5 S. capricornutum cells/mL. Starter cultures of C. dubia were obtained from the Center for Lake Superior Environmental Studies, University of Wisconsin - Superior.

All neonates used in the 7-d survival and reproduction tests were produced by cladocerans in culture that had released at least three broods. The initial age of the neonates in each test was <4 h old. The tests were conducted in 50 mL glass beakers containing 30 mL of test solution. All tests were conducted in an environmental chamber at 25 ± 1°C under a 16-h light:8-h dark photoperiod (fluorescent lights; 60-85 foot candles at the surface of the culture vessels). All test organisms were fed daily as described above at each 24-h renewal. Routine water quality was taken at the beginning and end of each 24-h renewal. The methods used for the chemical analyses are discussed in Section 4.7.2.

4.3.3 Fathead Minnow

The toxicity of the groundwater at pH 4 and 7 to fathead minnows (P. promelas) was determined five times by the EPA static renewal method (solutions renewed daily) given in Weber et al. (1989). All larvae used in the 7-d survival and growth tests were <24 h old at the start of the test. The tests were conducted in 600 mL glass beakers containing 400 mL of test solution. The dilution water was a 20% Perrier:80% reverse osmosis water. All test organisms were fed brine shrimp (Artemia sp.) nauplii <24 h old daily at each 24-h renewal. All tests were conducted at 25 ± 1°C under a 16-h light:8-h dark photoperiod (fluorescent lights; 60-85 foot candles). Routine water chemistry was performed at the beginning and end of each renewal. Dry weight was determined by drying at 100°C for a minimum of 12 h.

Fathead minnow larvae were obtained from the UMD/WREC culture maintained at 25 ± 1°C in UMD/WREC non-chlorinated well water (mean dissolved oxygen = 8.2; conductivity = 161 µs/cm; alkalinity = 53 mg/L as $CaCO_3$; hardness = 52 mg/L as $CaCO_3$; pH ranged from 7.1 to 8.0). The UMD/WREC culture procedures were similar to those recommended by Peltier and Weber (1985). The UMD/WREC culture was initiated with mature fathead minnows obtained from the U.S. EPA Environmental Monitoring and Support Laboratory - Cincinnati, Ohio.

Spawning fish were cultured in fiberglass tanks (2.4 x 0.8 x 0.5 m) containing 0.2 m UMD/WREC well water held at 25 ± 1°C. The spawning adults were fed a diet of frozen brine shrimp (Artemia sp.; Argent Chem. Lab., Redmond, WA) and TetraMin® Staple Food (Ramfab Aquarium Products Co., Oak Ridge, TN) twice daily. Excess food was removed daily. Four sets of spawning fathead minnows were maintained in the culture tanks at a ratio of 1 male:4 females. Replacement spawners were rotated at approximately 3-month intervals. Fathead minnow embryos were collected on spawning substrates (10 cm I.D. x 20 cm long PVC pipe sections cut longitudinally in equal portions) and transferred to 19 L aquaria at 25 ± 1°C in UMD/WREC well water for hatching. All stages of the fish were reared under a 16-h light:8-h dark photoperiod (fluorescent lights; 60-85 foot candles).

4.4 Genotoxicity Test

The Ames assay was used to evaluate the mutagenic potential of unconcentrated and concentrated groundwater, APG-EA tap water, and West Branch of Canal Creek water. This assay system has been shown to detect a diverse group of chemical mutagens (McCann et al., 1975 and McCann and Ames, 1976). The ability to predict chemical mutagenic activity may also serve as a carcinogen prescreen test (Ames et al., 1973). The ability to induce mutation is indicative of a chemical's genotoxic potential. Salmonella typhimurium/mammalian-microsome reverse mutation assays were conducted five times on the raw groundwater, APG-EA tap water, and West Branch of Canal Creek water samples described below. The assays were conducted on both unconcentrated and concentrated (100X via extraction in methylene chloride followed by rotoevaporation) samples as described below. The Ames mutagenicity assays were conducted by Microbial Associates, Inc., Rockville, MD.

Grab samples of raw groundwater were taken directly from the fed line to the biomonitoring laboratory. The first three of five West Branch of Canal Creek samples were taken via composite grab samples from the chronic histopathology exposure tanks; samples four and five were taken directly from West Branch of Canal Creek (Section 4.5). Grab samples of APG-EA tap water were taken via composite grab samples from the chronic histopathology exposure tanks. One liter samples of each material were siphoned into glass containers with no head space, packed in ice, and transported in insulated containers to Microbial Associates, Inc.

The following five sample sets were analyzed at approximately bimonthly intervals over the 9-month study. Both unconcentrated and concentrated (100X) analyses were conducted on groundwater, APG-EA tap water, and West Branch of Canal Creek water during the first sample period. During the second, third, and fourth sample periods, both unconcentrated and concentrated

analyses were conducted on groundwater and West Branch of Canal Creek water; APG-EA tap water was not analyzed. Concentrated samples only of groundwater, APG-EA tap water, and West Branch of Canal Creek water were analyzed during the fifth sample period.

The unconcentrated and concentrated (100X) samples were analyzed by Microbial Associates, Inc. Protocol No. SPGT501005 (Microbiological Associates, Inc., 1994). Briefly, the mutagenicity assays evaluated the groundwater, APG-EA tap water and West Branch of Canal Creek samples for their ability to induce reverse mutations at the histidine locus in the genome of specific S. typhimurium tester strains both in the presence and absence of an exogenous metabolic activation system of mammalian microsomal enzymes derived from Aroclor 1254-induced rat liver. The tester strains used in the assays were TA98 and TA100. A minimum of five dose levels of each test article or extract along with appropriate vehicle and positive controls were plated with tester strains TA98 and TA100 in the presence and absence of rat liver S9 activation. All dose levels of test article, vehicle controls, and positive controls were plated in duplicate.

4.5 Developmental Toxicity Test

Five bimonthly developmental toxicity tests were conducted at pH 4 and 7 using the frog embryo teratogenesis assay - Xenopus (FETAX). The assay is a 96-h quantitative developmental assay used to screen for developmental toxicants in aquatic media. The assays were conducted using the static renewal (solutions renewed every 24 h) test method Designation E 1439-91 of the American Society for Testing and Materials (ASTM, 1992). Embryolethality and malformations were determined; growth retardation was not evaluated. The identification and interpretation of malformations in the embryos at 96 h were made via the atlas of Bantle et al. (1991). Aliquots of the same groundwater used for the acute and short-term chronic toxicity biomonitoring tests were used for the FETAX assays. In addition to the standard assay with groundwater, a 100% APG-EA tap water sample was run concurrently with each assay to provide supporting toxicological data for the APG-EA tap water being used in the chronic histopathology exposures (Section 4.6).

Embryos between normal stage 8 blastulae and normal stage 11 gastrulae were obtained from X. laevis breeding colonies at the UMD/WREC as described below. The embryos were de-jellied in a 2% L-cysteine solution (2 g of L-cysteine per 98 mL of FETAX solution). Once de-jellied, the embryos were rinsed and re-suspended in FETAX solution (ASTM, 1992). The embryos were tested in glass petri dishes containing 10 mL of solution. Two replicates of 25 embryos/replicate were used for each test treatment. The tests were conducted at 24 ± 0.2°C under a 16-h light: 8-h dark photoperiod (fluorescent lights; ≈75 foot candles at the surface of the test medium) in a constant temperature

environmental chamber.

The UMD/WREC _X. laevis_ adult colony was maintained in flow-through (≈4 replacement volumes per day) circular polyethylene aquaria (0.91 m I.D. x 0.36 m high) with a water depth of 10 cm. Each aquarium contained a maximum of 10 adults. UMD/WREC non-chlorinated deep well water (water quality given in Section 4.3.3) held at 23.5 ± 0.5 °C served as the culture medium. All frogs were fed every 5-6 d with commercial beef liver supplemented with liquid vitamins (PolyViSol; Mead-Johnson Nutritionals, Evansville, IN). The colony was held under a photoperiod of 16 h light:8 h dark. Mating pairs were bred in the dark in 23.5 ± 0.5 °C UMD/WREC non-chlorinated water at ≈70 d intervals by injecting 400 and 800 I.U. of human chorionic gonadotropin (HCG) in the dorsal lymph sac of the males and females, respectively. Amplexus occurred 4-6 h after injecting HCG; egg deposition occurred 9-12 h following HCG injection. The original breeding stock was obtained from Xenopus I (Ann Arbor, MI).

4.6 Chronic Growth and Histopathology Test

Chronic histopathologic changes were evaluated using the Japanese medaka (_O. latipes_) as the experimental model. The Japanese medaka is a sensitive laboratory model for screening environmental pollutants which may induce histopathological changes and neoplasms (for ex., see Hawkins et al., 1995; Metcalfe, 1989; Powers, 1989). Both unexposed and fry exposed to diethylnitrosamine (DEN) were exposed continually under flow-through test conditions for a 9-month period. A subset of organisms was taken after 6 months of exposure for morphometric measurements and histopathological evaluation. The CEHR test designation was Protocol No. 401-002R (USACEHR, 1994a).

Fish were exposed in two separate assay systems to three dilutions of groundwater plus control diluent water using APG-EA tap water and West Branch of Canal Creek water as the diluent water. The two test systems were designated as the APG-EA test system and West Branch of Canal Creek test system. The fish were exposed to the following dilutions in both the APG-EA and West Branch of Canal Creek test systems: 25% groundwater by volume, 5% groundwater by volume, 1% groundwater by volume, and diluent water (APG-EA or West Branch of Canal Creek water). A 100% groundwater treatment could not be used because the pH of the groundwater was ≈4 which would have caused excessive mortality over the 9-month exposure period. Consideration was given to buffering the 100% groundwater to pH 7 and conducting the 100% treatment at pH 7. However, a preliminary evaluation of low pH groundwater buffered to pH 7 showed that excessive precipitation of metals occurred (Burton et al., 1994). Thus, 100% groundwater was not buffered to pH 7 and used as an experimental treatment. Additional control fish were also held at CEHR (see below).

The flow-through test solutions in both the APG-EA and West Branch of Canal Creek test systems were delivered by solenoid-activated proportional dilutor systems which were constructed primarily of glass and stainless steel; some silicon tubing was also used. The test concentrations in each test system were delivered to sixteen 19 L (5 gal) glass aquaria (4 aquaria at 25% groundwater by volume; 4 at 5% groundwater by volume; 4 at 1% groundwater by volume; and 4 control aquaria); each aquarium contained a volume of ≈16 L (4.25 gal). The study protocol required that all aquaria be held at 25 ± 2°C in constant temperature water baths. The APG-EA and West Branch of Canal Creek dilutors were calibrated to complete one full cycle every 3 ± 0.8 min. During a cycle, each tank received 300 ± 15 mL of solution.

Both unexposed fry and fry exposed to DEN, were reared off-site at CEHR until 16 d old. The DEN-initiated fish were exposed to 10 mg/L DEN for 48 h when the organisms were 13 d old. Prior to the start of the exposure to groundwater, the 16-d old fish were randomized into 8 groups of 60 fish/group for both the unexposed and DEN-initiated groups for both the APG-EA and West Branch of Canal Creek test systems. The fish were suspended in 1-L mesh-bottom glass beakers in the appropriate flow-through test aquaria in the biomonitoring laboratory. The fish were held in the beakers for one week after which they were released into the aquaria. Two replicates of both DEN-initiated and fish not initiated were held at CEHR for 9 months as additional controls.

Japanese medaka, 16-22 d old, were fed microworms two feedings per day and live brine shrimp (<u>Artemia</u> sp.) (<24 h old) two feedings per day (≈30 brine shrimp/fish). Pre-adult fish, 23-30 d old, were fed Tetramin® flake food two feedings per day and live brine shrimp <24 h old (one feeding per day; ≈40 brine shrimp per fish). Adult fish, >30 d old, were fed Tetramin® flake food (three feedings per day on Tuesday and Thursday and two feedings per day on the remaining days) and live brine shrimp (one feeding per day on Monday, Wednesday, and Friday). The ration was adjusted as the size of the fish increased. Tanks were cleaned on an as needed basis (usually 1-2 times a week) by scrubbing algae from the sides of the tanks, allowing the debris to settle, and then siphoning. Tetramin® was fed <u>ad libitum</u> for 15-30 min during each feeding.

The number of test organisms alive in each tank were monitored and recorded daily. Moribund fish were euthanized and fixed in Bouin's solution for subsequent histological observation. The dilutor cycle times were calculated and recorded daily. The volume of groundwater and diluent water delivered to the aquaria was checked weekly. When necessary, cycle time and/or volume distributions were adjusted. The dilutors were occasionally shutdown (for no more than one hour) and cleaned on an as needed basis. Daily water quality (DO, pH,

and temperature) was determined in all aquaria. Additional water quality tests (alkalinity, hardness, conductivity, total residual chlorine, free available chlorine, and total ammonia-nitrogen) were performed once a week in all aquaria (Section 4.7.2). A 16-h light:8-h dark photoperiod (fluorescent lights at 70-100 foot candles) was maintained throughout the study. Unionized ammonia-nitrogen was determined by the method of Thurston et al. (1979). Comprehensive chemical analyses were performed five times at bimonthly intervals as discussed in Section 4.7.1 on 100% groundwater, 100% APG-EA tap water, 100% West Branch of Canal Creek water and on water taken from each test system at 25, 5, and 1% groundwater by volume during the test periods shown in Table 1.

A major deviation from the study protocol was made after 6 months of exposure in the West Branch of Canal Creek test system. The water supply lines (both the primary and backup lines) from West Branch of Canal Creek to the biomonitoring trailer froze repeatedly during severe cold weather in late December through early February. The lost of water occurred because northeast winds blew the water out of the creek which subsequently shut down the water supply pump and caused the water to freeze in the water supply lines. During the periods when no West Branch of Canal Creek water was available, APG-EA tap water was used as an alternative diluent water for the West Branch of Canal Creek test system. Because of the frequent lost of West Branch of Canal Creek water (several days at a time), a decision was made at the end of the 6-month exposure period (February 5, 1995), to discontinue the use of West Branch of Canal Creek water. APG-EA tap water was used as the diluent water in the West Branch of Canal Creek test system for the last 3 months of the 9-month exposure. Groundwater was still provided to all exposure aquaria during the last 3 months of the exposure.

On day 181, approximately 20 Japanese medaka from each tank in both the APG-EA and West Branch of Canal Creek test systems were removed and taken back to CEHR for fixation (Bouin's solution) and subsequent histological observation. Wet weight and standard length measurements were taken on all fish. The morphometric data were taken to assess the effects of a chronic 6-month exposure to the contaminated groundwater as well as the general health of the fish. On day 272, when the exposure was completed, the remaining Japanese medaka were also taken back to CEHR for morphometric measurements and subsequent histological analysis. The histological analyses of the 6- and 9-month exposures were conducted by Experimental Pathology Laboratories, Inc. (EPL), Herndon, VA. Morphometric and histological analyses were also conducted on the 6- and 9-month additional control fish held at CEHR.

4.7 Chemical Analyses

4.7.1 Comprehensive Chemical Analyses

Comprehensive chemical analyses were performed five times at bimonthly intervals on 100% groundwater, 100% APG-EA tap water (charcoal filtered), and 100% West Branch of Canal Creek water (mechanically filtered to ≈80 μ). In addition, 25, 5, and 1% groundwater by volume samples from both the APG-EA and West Branch of Canal Creek test systems were analyzed during the test periods shown in Table 1. As discussed in the previous section, the surface water supply to the West Branch of Canal Creek aquaria was discontinued on February 5, 1995 and replaced with APG-EA dechlorinated tap water. The water samples taken from the West Branch of Canal Creek aquaria on March 23, 1995 and May 2, 1995 were labeled as West Branch of Canal Creek samples to prevent them from being confused with water samples taken from the APG-EA aquaria.

The comprehensive chemical analyses included general water quality, metals, priority pollutant volatile organics, priority pollutant base neutrals, priority pollutant acid extractables, organophosphorus pesticides, chlorinated pesticides, chlorinated herbicides, and munitions. The elements and/or compounds analyzed in each group are presented in the data tables discussed in Section 5.6.1. The 100% groundwater samples and 100% West Branch of Canal Creek sample nos. 1, 2, and 3 (Table 1) were grab samples taken directly from the fed lines to the biomonitoring trailer. West Branch of Canal Creek (100%) sample nos. 4 and 5 were grab samples taken directly from the creek. The 25, 5, and 1% groundwater by volume samples from both the APG-EA and West Branch of Canal Creek test systems were composite samples taken from the four replicate treatment tanks in the chronic histopathology study (Section 4.6). Grab samples of 100% APG-EA tap water were taken from a large polypropylene tank with a 99% particle replacement time of ≈12 h.

The water samples were placed in appropriate containers provided by the vendor for the various analyses. The containers were placed on ice and picked up by the vendor on the morning the samples were taken for the analyses. The comprehensive chemical analyses of all materials with the exception of the munitions were performed by Johnston Spectra Laboratories, Mechanicsburg, PA. The methods used for the analyses of all materials are given in the data tables discussed in Section 5.6.1. The five munitions samples were analyzed by CEHR via in-house procedures (USACEHR, 1993).

4.7.2 Routine Water Quality Analyses

Routine water quality was measured in all histopathology treatment tanks. Dissolved oxygen, pH, and temperature were

measured daily. Alkalinity, hardness, conductivity, total residual chlorine, free available chlorine, and total ammonia-nitrogen were measured once a week (all tests were performed on the same days). Unionized ammonia-nitrogen was determined by the method of Thurston et al. (1979). The methods used for the analyses followed the procedures given in Standard Methods (APHA et al., 1992).

In addition to the temperature measurements made in the aquaria during the chronic histopathology test, temperature was monitored continuously in one control tank of both the APG-EA and West Branch of Canal Creek test systems via a strip chart recorder (Cole-Palmer Thermistor Recorder Model No. 08354-15, Cole-Palmer Instrument Co., Chicago, IL).

4.8 Test Endpoints and Data Analyses

The test endpoint for the Microtox® 5- and 15-min EC50s was a reduction in bioluminescence. The EC50s and their 95% fiducial limits were determined by probit analysis using the software program supplied by Microtox® (Microtox®, 1988). The test endpoint for the acute effects of groundwater to the green alga was growth, measured as density (cells/mL). The 96-h EC50s for growth were estimated by using the "inhibition proportion" technique recommended by Horning and Weber (1985). The technique uses quantal analyses (e.g., probit or moving average angle methods) to estimate EC50s and their 95% fiducial or confidence limits. Since the assumptions of the quantal analysis are not met in the classical sense because of the very nature of the growth data, the count data at each treatment were averaged and subsequently converted to "inhibition proportions" using the formula below before a moving average angle analysis was performed (Stephan, 1978).

$$I = C - T / C * 100$$

where: C = the mean growth of the controls
T = the mean growth at a given treatment

The 96-h EC50s and their 95% confidence limits for embryo malformations in the FETAX assays were determined by the moving average angle method using an EPA statistical program (Stephan, 1978). The test endpoint for all 96-h Japanese medaka tests, 48-h and 7-d LC50 tests with cladocerans, and 96-h and 7-d LC50 tests with fathead minnows was mortality. The LC50s and their 95% confidence limits were determined by the moving average angle method when toxicity >50% occurred (Stephan, 1978).

The test endpoint for the chronic toxicity of groundwater at pH 4 and 7 to the green alga was growth measured as density (cells/mL). The no-observed-effect concentrations (NOEC) and lowest-observed-effect concentrations (LOEC) were determined by

Dunnett's test. Dunnett's test consists of an analysis of variance (ANOVA) to determine the error term, which is then used in a multiple comparison test for comparing each of the treatment means with the control mean. The assumptions upon which the use of Dunnett's test are contingent are that the observations within treatments are independent and normally distributed, with homogeneity of variance. The chi-square test for normality and Bartlett's test for homogeneity of variances were performed before the Dunnett's test was used. The above statistical tests were performed using Toxstat (Gulley et al., 1989) at a minimum probability level of 0.05.

The endpoints for the 7-d survival and reproduction tests with Ceriodaphnia were survival and young production. The endpoints for the fathead minnow 7-d survival and growth tests were survival and growth. The endpoints for the 96-h FETAX assay were survival and number of malformations. The statistics used for the LC50 data and FETAX EC50 (malformations) data are given above. NOECs and LOECs were determined as follows. The adult raw cladoceran survival data were analyzed by Fisher's Exact test. Arc-sine square root transformations were made on the FETAX percent embryo survival and percent embryo malformation data as well as the fathead minnow percent survival raw data before further data analyses were performed. With the exception of the cladoceran survival data, all data were then subjected to a chi-square test of normality and Bartlett's test for homogeneity of variance.

When the data sets met the assumptions of normality and homogeneity of variance, a parametric statistic was used. Dunnett's test was used when the number of replicates was constant among treatments. A t-test with Bonferroni adjustment of error rate was performed when the number of replicates was not constant among treatments. When a data set failed to meet the assumptions of normality or homogeneity of variance, a nonparametric statistic was used. Steel's Many-One Rank test was performed when equal number of replicates were used. The statistical tests were performed using Toxstat (Gulley et al., 1989). A minimum probability level of 0.05 was used for all tests.

The morphometric endpoints for the Japanese medaka chronic growth and histopathology study after 6 and 9 months of exposure were wet weight and standard length. The analyses of the 6- and 9-month wet weight and standard length data were conducted as a split plot ANOVA using a general linear model type III test (SAS, 1989). The whole plots were tanks which were in turn split into subplots by fish sex. The whole plot treatments that were applied to separate tanks and thus were tested against the among tank error were 1) diluent water (APG-EA tap water and West Branch of Canal Creek water); 2) DEN (DEN-initiated and no DEN-initiated); and 3) concentration (0, 1, 5, and 25% groundwater by

volume). The sex (male vs. female) split plot factor that occurred within each tank was tested against the within tank error term. The three whole plot factors and all their interactions were tested at the whole plot level. The split plot factor and all its interactions with whole plot factors were tested against the within plot error. Wet weight and standard length at 6 and 9 months for the control fish held at CEHR vs. the APG-EA control fish were analyzed by linear contrast within the split plot analysis.

The raw data were checked at the whole plot level for normality and homogeneity of variance by the Shapiro Wilks test and Levene's test, respectively. The split plot data were also checked for normality by the Shapiro Wilks test. A test for homogeneous variance was not possible for the split plot residuals because only two residuals were present for each treatment. A minimum probability level of 0.05 was used for all tests. The histopathology data enumerated by Experimental Pathology Laboratory, Inc. at 6 and 9 months were not treated statistically.

SECTION 5

RESULTS AND DISCUSSION

The Results and Discussion Section is organized as follows. The results and discussion for all of the biomonitoring systems are presented in separate sections for each test system. The endpoints/responses for each biomonitoring toxicity test are summarized in Table 2. The table is organized as Tests Nos. 1, 2, 3, 4, and 5 which reflect the bimonthly test design. The Microtox® and Japanese medaka chronic histopathology and morphometric results are presented under the Test No. 1 column for space convenience purposes only; the tests were not bimonthly tests as the heading implies. The raw data, water quality data, and statistical analyses for the biomonitoring test systems as well as the chemical analyses results are given in separate Appendices as referred to in the appropriate sections for each test system.

5.1 Acute Toxicity Tests

5.1.1 Microtox®

A summary of the Microtox® 5- and 15-min EC50 (reduction of bioluminescence) results is given in Table 2. The 5- and 15-min test data for the grab samples of raw groundwater are given in Appendix 1, Table A1-1. The data for the Microtox® assays conducted on composite samples taken from the 25, 5, and 1% groundwater by volume histopathology tanks diluted with APG-EA tap water are given in Appendix 1, Tables A1-2, A1-3, and A1-4, respectively. The composite and grab sample data for raw West Branch of Canal Creek water are summarized in Table A1-5 of Appendix 1. The data for the Microtox® assays conducted on composite samples taken from the 25, 5, and 1% groundwater by volume West Branch of Canal Creek histopathology tanks are given in Appendix 1, Tables A1-6, A1-7, and A1-8, respectively. The weekly Microtox® results for the raw APG-EA tap water are presented in Table A1-9 of Appendix 1. The results of the special two month volatile organics study conducted on West Branch of Canal Creek water taken directly from the supply line to the biomonitoring facility are summarized in Appendix 1, Table A1-10. The data for the Microtox® assays conducted on the groundwater buffered to a pH of ≈7 and the pH of the samples used in the assays are given in Appendix 2, Tables A2-1 and A2-2.

The Microtox® 5- and 15-min EC50s for 100% groundwater at pH 4 ranged from 18.7-70.9 and 31.9-88.4% groundwater by volume, respectively (Table 2). Less toxicity was observed in the 15-min EC50s relative to the 5-min EC50s (Appendix 1, Table A1-1). Only one sample of 100% groundwater buffered to a pH of 7 exhibited toxicity (Appendix 2, Table A2-1). The 5- and 15-min EC50s for

TABLE 2. SUMMARY OF THE TOXICITY ENDPOINTS/RESPONSES FOR BIOMONITORING TESTS CONDUCTED ON CANAL CREEK GROUNDWATER (WELL CC-27B) FROM AUGUST 12, 1994 TO MAY 10, 1995.

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5
Microtox®:						
100% (pH 4)	5-min EC50[b]	19-71[c]	N/A	N/A	N/A	N/A
100% (pH 4)	15-min EC50[b]	32-88[d]	N/A	N/A	N/A	N/A
100% (pH 7)	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
100% (pH 7)	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
25% APG H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
25% APG H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
5% APG H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
5% APG H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
1% APG H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
1% APG H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
25% WB H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
25% WB H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
5% WB H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
5% WB H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
1% WB H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
1% WB H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
100% APG H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
100% APG H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
100% WB H_2O	5-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A
100% WB H_2O	15-min EC50[b]	Not toxic	N/A	N/A	N/A	N/A

TABLE 2. (CONTINUED)

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5
Green alga:						
pH 4	96-h EC50[e]	57 (54.5-59.5)	52 (48.6-55.6)	56 (47.2-67.4)	51 (47.7-55.3)	48 (44.6-51.0)
pH 4	NOEC[e]	10	10	18	10	18
pH 4	LOEC[e]	18	18	32	18	32
pH 7	96-h EC50[e]	80 (62.5-111.8)	67 (59.9-77.1)	78 (50.1-111.1)	67 (59.4-78.8)	96 (81.5-124.6)
pH 7	NOEC[e]	10	10	18	18	18
pH 7	LOEC[e]	18	18	32	32	32
Cladoceran:						
pH 4	48-h LC50	65 (57.2-75.5)	65 (57.2-75.5)	65 (57.2-75.5)	65 (57.2-75.5)	65 (62.5-67.1)
pH 4	7-d LC50	65 (57.2-75.5)	65 (57.2-75.5)	63 (55.0-73.7)	59 (50.0-69.7)	62 (59.7-64.4)
pH 4	NOEC[f]	10	10	18	10	10
pH 4	LOEC[f]	18	18	32	18	18
pH 7	48-h LC50	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
pH 7	7-d LC50	56 (47.1-67.4)	66 (52.9-97.6)	38 (27.8-49.0)	38 (29.9-48.0)	74 (69.5-79.2)
pH 7	NOEC[f]	10	10	10	10	18
pH 7	LOEC[f]	18	18	18	18	32

TABLE 2. (CONTINUED)

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5
Fathead minnow:						
pH 4	96-h LC50	46 (41.6-51.3)	60 (56.7-64.7)	39 (35.9-41.7)	54 (50.3-57.7)	50 (45.4-55.6)
pH 4	7-d LC50	42 (37.9-46.7)	45 (40.3-50.3)	32 (28.8-36.0)	44 (39.9-49.1)	47 (42.8-52.2)
pH 4	NOEC[g]	18	32	18	32	32
pH 4	LOEC[g]	32	56	32	56	56
pH 7	96-h LC50	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
pH 7	7-d LC50	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
pH 7	NOEC	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
pH 7	LOEC	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
Japanese medaka:						
pH 4	96-h LC50	78 (66.7-102.3)	63 (55.4-71.7)	68 (60.9-78.1)	63 (55.0-73.7)	94 (84.6-107.2)
pH 7	96-h LC50	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic
West Branch	96-h LC50	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic

TABLE 2. (CONTINUED)

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5
Ames:						
Groundwater	Mutagenicity	Negative	Negative	Negative	Negative	[h]
Groundwater (100X)	Mutagenicity	Negative	Negative	Negative	Negative	Negative
West Branch	Mutagenicity	Negative	Negative	Negative	Negative	[h]
West Branch (100X)	Mutagenicity	Negative	Negative	Negative	Negative	Negative
APG-EA H_2O	Mutagenicity	Negative	[h]	[h]	[h]	[h]
APG-EA H_2O (100X)	Mutagenicity	Negative	[h]	[h]	[h]	Negative
FETAX:						
pH 4	4-d LC50	No LC50	No LC50	No LC50	No LC50	Not toxic
pH 4	4-d EC50[i]	No EC50	90 (69.5-183.6)	No EC50	78 (53.1-6698.2)	No EC50
pH 4	NOEC[j]	18	10	10	10	10
pH 4	LOEC[j]	32	18	18	18	18
pH 7	4-d LC50	Not toxic	No LC50	Not toxic	No LC50	Not toxic
pH 7	4-d EC50[i]	Not toxic	Not toxic	No EC50	No EC50	No EC50
pH 7	NOEC[j]	Not toxic	Not toxic	18	18	18
pH 7	LOEC[j]	Not toxic	Not toxic	32	32	32

TABLE 2. (CONTINUED)

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5
Chronic growth and histopathology:						
6 months	Growth	Differences occurred[k]	N/A	N/A	N/A	N/A
6 months	Lesions	[l]	N/A	N/A	N/A	N/A
9 months	Growth	Differences occurred[k]	N/A	N/A	N/A	N/A
9 months	Lesions	[l]	N/A	N/A	N/A	N/A

[a] All endpoints are given as percent groundwater by volume.
[b] Range of all EC50s for reduction in bioluminescent activity conducted from August 12, 1994 to May 10, 1995.
[c] The 95% fiducial limits of the 5-min EC50s of 19 and 71 at pH 4 are 0.9-396.6 and 16.5-305.6, respectively.
[d] The 95% fiducial limits of the 15-min EC50s of 32 and 88 at pH 4 are 8.3-122.6 and 29.8-262.0, respectively.
[e] Test endpoint- reduction in growth (cell density).
[f] Test endpoint- reduction in neonate production.
[g] Test endpoint- reduction in growth (dry weight) for Test No. 1 at pH 4; the test endpoint for Test Nos. 2, 3, 4, and 5 at pH 4 was an increase in mortality rather than a reduction in growth.
[h] Assay not conducted.
[i] 96-h EC50 for malformations.
[j] Test endpoint- increased number of malformations for Test Nos. 1, 2, 3, 4, and 5 at pH 4 and Test Nos. 3 and 5 at pH 7; the test endpoint for Test No. 4 at pH 7 was an increase in mortality rather than an increase in malformations.

TABLE 2. (CONTINUED)

Bioassay	Endpoint	Value[a]				
		Test No. 1	Test No. 2	Test No. 3	Test No. 4	Test No. 5

[k] A number of differences in both wet weight and standard length occurred. See Section 5.5.2 for further detail.
[l] See Section 5.5.3 for results.

the sample were 55.6 and 48.6% groundwater by volume, respectively. The raw groundwater was much less toxic at pH 7 than at pH 4.

No toxicity was detected in any raw West Branch of Canal Creek water samples (Table 2). No toxicity was detected in any samples taken from the 25, 5, and 1% groundwater by volume histopathology tanks diluted with APG-EA tap water. Likewise, no toxicity was found in any samples taken from the 25, 5, and 1% groundwater by volume West Branch of Canal Creek histopathology tanks.

The toxicity of the raw groundwater as shown by the Microtox® assay is not surprising when one considers the complex mixture of the contaminants in the groundwater (Section 5.6.1; Table 3). For example, the 5-min EC50s for both copper and zinc are less than the groundwater concentrations shown in Table 3 (Qureshi et al., 1982; Elnabarawy et al., 1988); the 15-min EC50s for cobalt, copper and zinc are less than the concentrations shown in Table 3 (Elnabarawy et al., 1988). Similarly, several volatile chlorinated organics have been shown to be toxic via the 5- and/or 15-min Microtox® analysis (Kaiser and Ribo, 1988). Chloroform, 1,2-dichlorobenzene, 1,2-dichloroethane, tetrachloroethane, 1,2,4-trichlorobenzene, and 1,1,1-trichloroethane all have 5- and/or 15-min EC50s below the concentrations found in the groundwater (Curtis et al., 1982; McFeters et al., 1985; Qureshi et al, 1982; Ribo and Kaiser, 1983).

With the exception of one sample, no acute toxicity was observed via Microtox® when the groundwater was buffered to pH 7. The reason for the elimination of acute toxicity at pH 7 is not clear. One may speculate that the reduction and/or elimination of toxicity at pH 7 may be related to the heavy metals as they shift from a divalent cation at pH 4 to less toxic species at pH 7 (Lee, 1973); however, there is no evidence that this mechanism is appropriate for the Microtox® reaction.

5.1.2 Green Alga, Cladoceran, Fathead Minnow, and Japanese Medaka

The 96-h EC50s (reduction in growth) for the green alga exposed to raw groundwater at pH 4 and buffered groundwater at pH 7 are given in Table 2. The raw data at pH 4 and 7 for Test Nos. 1-5 are given in Appendices 3-12. The 96-h EC50s for reduction in growth at pH 4 ranged from 48-57% groundwater by volume (Table 2). The 96-h EC50s in the groundwater buffered to pH 7 ranged from 67-96% groundwater by volume.

Aluminum and silver have been show to be toxic to _S. capricornutum_ at concentrations found in the groundwater. The 4-d EC50s (biomass) for aluminum (Al species not specified) range from 460-570 μg/L (U.S. EPA, 1988) which are well below the range

TABLE 3. SUMMARY OF THE FIVE BIMONTHLY CHEMICAL ANALYSES (RANGE OF CONCENTRATIONS) CONDUCTED ON RAW CANAL CREEK GROUNDWATER (WELL CC-27B) FROM AUGUST 1994 TO MAY 1995 - GENERAL WATER QUALITY

Parameter	Concentration	Unit
Alkalinity	<1-4.0	mg/L as $CaCO_3$
Ammonia Nitrogen	0.011-0.055	mg/L as N
Bromide	<0.2	mg/L as Br
Chloride	74-147	mg/L as Cl
Cyanide	<0.002-<0.006	mg/L as Cn
Fluoride	0.241-0.349	mg/L as F
Hardness	58.0-66.4	mg/L as $CaCO_3$
pH	3.62-4.30	Std. Unit
Nitrate	1.59-2.87	mg/L as N
Nitrite	<0.001-<0.002	mg/L as N
Phosphate	0.151-1.32	mg/L as P
Specific Conductance @ 25 °C	336-441	µmhos/cm
Sulfate	92.0-119	mg/L as SO_4
Sulfite	<0.002-<0.02	mg/L as H_2S
Total Organic Carbon	<2.0-2.6	mg/L
Total Suspended Solids	<1.0-3.5	mg/L

TABLE 3. (CONTINUED) - METALS[a]

Parameter	Concentration	Unit
Aluminum	1660-2390	μg/L as Al
Antimony	<14.1-<50	μg/L as Sb
Arsenic	<3.2-<5	μg/L as As
Beryllium	<0.5-1.8	μg/L as Be
Boron	55.4-409	μg/L as B
Cadmium	<1.5-<5	μg/L as Cd
Calcium	15700-17600	μg/L as Ca
Chromium	<6-<10	μg/L as Cr
Cobalt	41.7-46.1	μg/L as Co
Copper	10.2-24.4	μg/L as Cu
Iron	5.5-34.5	μg/L as Fe
Lead	<14.5-<50	μg/L as Pb
Magnesium	5360-6390	μg/L as Mg
Manganese	639-848	μg/L as Mn
Mercury	<0.1-0.1	μg/L as Hg
Molybdenum	<28.9-52.8	μg/L as Mo
Nickel	22.2-26.7	μg/L as Ni
Potassium	2000-2750	μg/L as K
Selenium	<11.1-<50	μg/L as Se
Silver	<0.4-46.8	μg/L as Ag
Sodium	56900-62600	μg/L as Na
Thallium	<50-<75	μg/L as Ti
Tin	<9.7-<10	μg/L as Sn
Zinc	57.5-88.4	μg/L as Zn

TABLE 3. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS

Parameter	Concentration	Unit
Bromochloromethane	4.6-113.4	μg/L
Bromodichloromethane	0.78-97.9	μg/L
Carbon Tetrachloride	32.8-57.7	μg/L
Chloroform	54.0-103	μg/L
1,2-Dichlorobenzene	0.53[b]	μg/L
1,2-Dichloroethane	2.1-3.6	μg/L
cis-1,2-Dichloroethene	1.3-3.3	μg/L
1,1,2,2-Tetrachloroethane	53.8-75.9	μg/L
Tetrachloroethene	3.49-6.7	μg/L
1,2,4-Trichlorobenzene	0.6[b]	μg/L
1,1,1-Trichloroethane	4.6[b]	μg/L
1,1,2-Trichloroethane	0.7-1.08	μg/L
Trichloroethene	64.4-102.0	μg/L

[a] The metal concentrations are total metal; not dissolved metal.
[b] Compound found in only one of five samples.

of 1660-2390 μg/L found in the groundwater (Table 3). The 4-d EC50 (effect parameter not given) for silver has been reported to be 2.6 μg/L (unpublished data as cited in U.S. EPA, 1987). Few data are available on the possible joint toxicity of heavy metals to green algae (Faust et al., 1994). The groundwater at pH 7 appeared to be slightly less toxic than the groundwater at pH 4 (Table 2); however, the data were not treated statistically. It is difficult to speculate about possible differences in acute toxicity at pH 4 and 7 because the chemistry of aluminum and silver as a function of pH is not well understood (U.S. EPA 1987 and 1988). No single priority pollutant organic for which there are toxicity data can account for the toxicity observed in the alga (U.S. EPA, 1986b).

The 48-h acute LC50 toxicity data for the cladoceran at pH 4 and 7 are summarized in Table 2. The raw data, including test water quality, for Test Nos. 1-5 at pH 4 and 7 are given in Appendices 13-22. Groundwater at pH 4 was acutely toxic to the cladoceran (Table 2). The 48-h LC50 was 65% groundwater by volume for all five tests. Buffered groundwater was not acutely

toxic to the cladoceran in any of the five tests after a 48-h exposure.

The 96-h LC50 data for the fathead minnow at pH 4 and 7 are summarized in Table 2. The raw data, including water quality, for Test Nos. 1-5 at pH 4 and 7 are given in Appendices 23-32. Groundwater at pH 4 was acutely toxic to the fathead minnow (Table 2). The 96-h LC50s ranged from 39-60% groundwater by volume for the five tests. Buffered groundwater at pH 7 was not toxic in any test after a 96-h exposure.

The 96-h LC50 data for the Japanese medaka at pH 4 and 7 are also summarized in Table 2. The raw data, including water quality, for Test Nos. 1-5 at pH 4 and 7 are given in Appendices 33-42. Groundwater at pH 4 was acutely toxic to the Japanese medaka (Table 2). The 96-h LC50s ranged from 63-94% groundwater by volume for the five tests. Buffered groundwater at pH 7 was not toxic in any test after a 96-h exposure. No toxicity occurred to Japanese medaka exposed to West Branch of Canal Creek water for 96 h.

The acute toxicity of the groundwater to the cladoceran, fathead minnow, and Japanese medaka at pH 4 may be attributable to the heavy metals in the groundwater (Table 3). Several EPA priority pollutant heavy metals (aluminum, copper, nickel, silver, and zinc) were found in the groundwater. The concentration of copper and silver (when adjusted for water hardness) in the groundwater exceeded in some cases the EPA acute numerical water quality criterion of 18 and 4.1 μg/L, respectively, for freshwater organisms (U.S. EPA, 1984a; U.S. EPA, 1987). Furthermore, metals such as copper and zinc exist primarily as divalent cations at a pH of 4 which is the most toxic form of the metal (Lee, 1973; Sprague, 1985). It is well established that the toxicity of metals in chemical mixtures is additive for many aquatic animals (Marking, 1985). It is likely that the toxicity observed in the study may have been additive or greater than additive (de March, 1988). The elimination of acute toxicity at pH 7 for the cladoceran, fathead minnow, and Japanese medaka is most likely related to the reduction in toxicity of heavy metals as they shift from a divalent cation at pH 4 to less toxic species at pH 7 (Lee, 1973). The possibility that low pH <u>per</u> <u>se</u> may also play a role in the toxicity observed at pH 4 should also be considered since no toxicity occurred at pH 7. EPA acute (or chronic) numerical water quality criteria are not available for any of the organics present in the groundwater (U.S. EPA, 1986b).

5.2 Short-term Chronic Toxicity Tests

5.2.1 Green Alga

The NOECs and LOECs (reduction in cell density) for the green alga exposed to groundwater at pH 4 and 7 are summarized in

Table 2. The test data and statistical analyses for Test Nos. 1-5 are given in Appendices 3-12. At pH 4, the NOECs for the five tests ranged from 10-18% groundwater by volume. The LOECs ranged from 18-32% groundwater by volume. At pH 7, the NOECs and LOECs, respectively, ranged from 10-18 and 18-32% groundwater by volume. With the exception of Test No. 4, the NOECs and LOECs were exactly the same at pH 4 and 7 for the same test period. The NOECs and LOECs were less at pH 7 than at pH 4 in Test No. 4 only. Thus, with the exception of one test, no difference in algal toxicity was found for groundwater at pH 4 and pH 7. As stated above in Section 5.1.2, it is difficult to speculate about the toxicity of aluminum and silver as a function of pH because the chemistry of aluminum and silver as a function of pH is not well understood (U.S. EPA 1987 and 1988).

5.2.2 Cladoceran

The 7-d LC50s, NOECs, and LOECs for the cladoceran exposed to groundwater at pH 4 and 7 are summarized in Table 2. The test data and statistical analyses for Test Nos. 1-5 are given in Appendices 13-23. The groundwater at pH 4 and 7 was toxic in all tests. The short-term chronic 7-d LC50s at pH 4 ranged from 59-65% groundwater by volume. The 7-d LC50s at pH 7 ranged from 38-74% groundwater by volume. The groundwater appeared to be more toxic at pH 7 than pH 4 in Test Nos. 3 and 4; no statistical analysis was conducted to determine significant differences. The 7-d LC50s at pH 7 in Tests Nos. 3 and 4 were 38% groundwater by volume in contrast to 59 and 63% groundwater by volume at pH 4.

The NOECs (reduction in neonate production) at pH 4 ranged from 10-18% groundwater by volume while the LOECs ranged from 18-32% groundwater by volume in the five tests. Similarly, the NOECs (reduction in neonate production) at pH 7 ranged from 10-18% groundwater by volume while the LOECs ranged from 18-32% groundwater by volume in the five tests. The NOECs and LOECs were essentially the same at pH 4 and pH 7.

5.2.3 Fathead Minnow

The 7-d LC50s, NOECs, and LOECs for the fathead minnow exposed to groundwater at pH 4 and 7 are summarized in Table 2. The test data and statistical analyses for Test Nos. 1-5 are given in Appendices 23-32. The groundwater at pH 4 was toxic in all tests. The short-term chronic 7-d LC50s at pH 4 ranged from 32-47% groundwater by volume. The NOECs at pH 4 ranged from 18-32% groundwater by volume while the LOECs ranged from 32-56% groundwater by volume in the five tests. The NOEC and LOEC endpoints at pH 4 were a reduction in growth for Test No. 1 and an increase in mortality in Test Nos. 2-5. The groundwater was not toxic when buffered to pH 7.

The chronic toxicity observed for the cladoceran and fathead minnow may be related to several heavy metals (Table 3). As

discussed below in Section 5.6.1, copper, mercury, and silver concentrations in the groundwater exceeded in one or more tests the EPA freshwater chronic numerical water quality criteria of 12 $\mu g/L$ for copper (U.S. EPA, 1984a), 0.012 $\mu g/L$ for mercury, and the proposed criterion of 0.92 $\mu g/L$ for silver (U.S. EPA, 1987). The criteria for copper and silver are hardness dependent criteria; 100 mg/L as $CaCO_3$ used.

None of the priority pollutant organics found in the groundwater currently have numerical water quality criteria values because insufficient data exist to develop criteria (Potts, 1994). The lowest observed effect levels (LOEL) are given in the EPA water quality criteria for several of the organics (chloroform, 1,2-dichlorobenzene, 1,1,2,2-tetrachloroethane, and 1,1,2-trichloroethane); however, all of the LOELs are one or more orders of magnitude higher than the concentrations found in the groundwater. Thus, it is not clear what role, if any, additive toxicity from the metals and organics present in the groundwater may play in the chronic toxicity observed in the cladoceran and fathead minnow.

In contrast to the general reduction in acute toxicity when the cladoceran was tested in buffered groundwater, the chronic toxicity NOEC and LOEC values for the cladoceran were essentially the same at pH 4 and 7 (Table 2). Thus, the suggestion above that toxicity attributable to heavy metals is reduced at the higher pH does not appear to be valid for the cladoceran in the chronic tests. The reason for this observation is not clear. Similar toxicity responses at pH 4 and 7 indicate that the effect of low pH *per se* is not important.

Buffered groundwater was not toxic to fathead minnow (Table 2). The elimination of chronic toxicity at pH 7 for the fathead minnow is most likely related to the reduction in toxicity of heavy metals as they shift from a divalent cation at pH 4 to less toxic species at pH 7 (Lee, 1973). However, one should not categorically rule out the possibility that the low pH *per se* may also account for some of the toxicity observed at pH 4 since no toxic occurred at pH 7.

5.3 Genotoxicity Tests

The results of the Ames mutagenicity assays are summarized in Table 2. Both unconcentrated and concentrated (100X) Ames assays were conducted on raw groundwater and West Branch of Canal Creek water in Test Nos. 1-4; assays on the concentrated fractions only were conducted in Test No. 5. Ames assays were conducted on both unconcentrated and concentrated (100X) APG-EA tap water samples in Test No. 1; only the concentrated sample was assayed in Test No. 5. The reference for each study data report is given in Appendix 43 so that a copy can be obtained if further information is desired; the actual data reports were not included in the Appendix because of the excessive length of the reports.

All unconcentrated and concentrated (100X) assays of groundwater, West Branch of Canal Creek water, and APG-EA tap water were found to be non-mutagenic (negative) with tester strains TA98 and TA100 in both the presence and absence of an exogenous metabolic activation system of mammalian microsomal enzymes derived from Aroclor-induced rat liver (S9 mix). Of the groundwater contaminants listed in Table 3, carbon tetrachloride, 1,2-dichloroethane, and trichloroethene have been reported to be chemical mutagens (Forum for Scientific Excellence, Inc., 1990). The lack of mutagenic activity in the groundwater concentrated 100X suggests that the concentrations of the mutagens are too low to induce significant mutations in the Ames assay (Hoffmann, 1991; Shugart, 1995).

5.4 Developmental Toxicity Test

The 4-d LC50, 4-d EC50 (malformations), NOEC, and LOEC results for the FETAX assays conducted in groundwater at pH 4 and 7 are summarized in Table 2. The test data, statistical analyses, and types and numbers of malformed embryos that occurred after 96 h of exposure for Test Nos. 1-5 are given in Appendices 44-53. Little embryolethality occurred in the groundwater at pH 4 or 7 (Table 2). Some toxicity occurred in Test Nos. 1-4 at pH 4; however, no LC50s could be calculated because <50% mortality occurred. The raw groundwater was not toxic to the embryos at pH 4 in Test No. 5. The buffered groundwater was not toxic in three of the five tests. Some mortality occurred in Test Nos. 2 and 4; however, LC50s could not be calculated.

Significant (α = 0.05) embryo malformations occurred in all of the raw groundwater assays; malformations also occurred in three of the five assays at pH 7. Ninety-six-hour EC50s (malformations) of 90 and 78% groundwater by volume were obtained in Test Nos. 2 and 4 at pH 4; 96-h EC50s could not be calculated for any of the other tests at pH 4 or 7. The NOECs and LOECs (malformations) for the five groundwater assays at pH 4 was 18 and 32% groundwater by volume in Test No. 1 and 10 and 18% groundwater by volume, respectively, in Test Nos. 2-5. The NOECs and LOECs for Test Nos. 3, 4, and 5 at pH 7 were all 18 and 32% groundwater by volume, respectively. The test endpoint for Test No. 4 at pH 7 was an increase in mortality rather than malformations. The buffered groundwater was not toxic in Test Nos. 1 and 2. The buffered groundwater was less toxic than the raw groundwater in all assays where toxicity occurred.

A total of 308 malformations were observed in the embryos exposed to raw groundwater (see last table in each of Appendices 44-53). The types of malformed embryos (as described by Bantle et al., 1991) after 96 h of exposure in raw groundwater were primarily multiple edema (≈32% of total malformations), coiled guts (≈26%), notochord (≈18%) and facial (≈12%). Severe (≈6%), cardiac edema (≈3%), abdominal edema (≈2%), eye (<1%), brain

(<1%), and cardiac (<1%) were also observed in <14% of the total malformations. Fewer malformations were observed in the buffered groundwater tests (221 malformations); however, the same types of malformations that occurred in the raw groundwater were observed in the buffered groundwater assays. The most frequent malformations observed in buffered groundwater included coiled guts (≈46%), multiple edema (≈29%), and notochord (≈10%). Severe (≈7%), facial (≈5%), cardiac edema (≈2%), and abdominal edema (≈2%) were observed in <16% of the total malformations. The incidence of malformations were generally greater at the higher test concentrations in both the raw and buffered groundwater.

The developmental toxicity found in the FETAX assays is most likely related to the heavy metals present in the groundwater. Several heavy metals, including copper, cadmium, and zinc, have been shown to cause developmental problems in lower vertebrate aquatic organisms (Weis and Weis, 1989). Dawson et al. (1985) found that mixtures of heavy metals (copper, cadmium, lead, and zinc) from acidic mine sources caused teratogenic effects and mortality when evaluated by FETAX. When the pH was adjusted from lows which ranged from 3.2 to 5.9 to pH 7, toxicity and teratogenicity decreased. The same response occurred in the present study. The possible role of the organics in the groundwater is not clear since FETAX data do not exist for the individual materials (Bantle, 1994 and 1995).

5.5 Chronic Growth and Histopathology Test

The Japanese medaka growth results at 6 and 9 months and the histological results for the 6- and 9-month exposures in both the APG-EA and West Branch of Canal Creek test systems are briefly summarized in Table 2. A tabulation of the disposition of the fish (i.e., number that were sacrificed at 6 and 9 months, number that died, etc.) in all aquaria during the 9-month study is given in Appendix 54. The wet weight and standard length measurements of all fish in each replicate tank in each treatment at 6 months for the West Branch of Canal Creek and APG-EA study groups are given in Appendix 55, Tables A55-1 and A55-2, respectively. The morphometric data for the additional control fish held at CEHR for 6 months are given in Table A55-3. The 9-month growth data for the West Branch of Canal Creek and APG-EA fish are given in Appendix 55, Tables A55-4 and A55-5. The wet weight and standard length measurements of the CEHR control fish at 9 months are given in Table A55-6. The statistical analyses of the 6-month interim and 9-month final Japanese medaka chronic histopathological growth data are given in Appendix 56. A summary of the 6- and 9-month histopathology results is given in Appendix 57.

5.5.1 Mortality

The total number of fish that died at the end of 9 months in all treatments including the controls ranged from a low of 1.7%

to a high of 21.7%. These percentages do not include the fish shown in Appendix 54, Table A54-1 that could not be accounted for at the end of the 9-month study. The percent dead for all fish, including the controls, held in the APG-EA system ranged from 1.7 to 15.0%. The average mortality, including the controls, for all treatments in the APG-EA system was 9.1%. The percent mortality of all the fish held in the West Branch of Canal Creek system ranged from a low of 3.3% to a high of 21.7%. The average mortality, including the controls, for the West Branch of Canal Creek system was 13.5%. The mortality of the four CEHR control tanks ranged from 0 to 3.3%; the average was 2.5%.

If one assumes that all of the missing fish shown in Appendix 54, Table A54-1 died and the missing fish and known dead fish are summed, the percent mortalities would be as follows. The percent dead, including the controls, held in the APG-EA system would range from 5.0 to 20.0%. The average mortality, including the controls, for all treatments in the APG-EA system would be 12.3% The percent mortality of all the fish held in the West Branch of Canal Creek system would range from a low of 6.7% to a high of 31.7%. The average mortality, including the controls, for the West Branch of Canal Creek system would be 19.3%. The mortality of the four CEHR control tanks would range from 0 to 6.7%; the average would be 4.2%.

To the authors knowledge, there are no test mortality acceptability criteria for a 9-month test. If one uses the mortality acceptability criteria for early life stage (ELS) toxicity tests which run for 1-2 months after hatch or fry swim-up, the mortality observed in this study falls within ELS acceptability criteria (Goodman, 1986). For example, the ELS test acceptability criteria for all eight freshwater species listed in the draft ASTM standard guide (Japanese medaka are not included in the guide) run from 60-75% (Goodman, 1986). That is, for a test to be acceptable, 60-75% of the control organisms must be alive at the end of the study depending on the species being studied. The percent survival of the Japanese medaka in all treatments, including the control and experimental fish, in both the APG-EA and West Branch of Canal Creek systems was greater than the draft ASTM ELS acceptability criteria for control fish. If one looks at the percent survival of all the missing fish plus known dead fish, the worse case of 68.3% survival (31.7% mortality) would still fall within the control ELS test acceptability criteria range of 60-75%.

5.5.2 Morphometric Analyses

No difference in wet weight at 6 months was found in the whole plot analysis of APG-EA diluent water vs. West Branch of Canal Creek water; DEN-initiated vs. fish not uninitiated; and APG-EA vs. West Branch of Canal Creek 0, 1, 5, and 25% groundwater by volume (Appendix 56). A significant interaction (α = 0.0186) for wet weight was found at 6 months in the split

plot analysis of diluent water (APG-EA water vs. West branch of Canal Creek water) x sex (male vs. female). The males in APG-EA water were significantly (α = 0.0358) larger than the males in West Branch of Canal Creek water. The females in West Branch of Canal Creek water were significantly (α = 0.0432) larger than the males in the creek water.

A significant difference (α = 0.0001) in standard length at 6 months was found between fish in APG-EA water vs. West Branch of Canal Creek water in the whole plot analysis (Appendix 56). The APG-EA fish were longer than the West Branch of Canal Creek fish. The whole plot analysis also showed that a significant (α= 0.0053) interaction occurred in the concentration x DEN treatments at 6 months for standard length. The control DEN-initiated fish were longer than the fish in all of the following treatments: control fish not initiated (α = 0.0009); DEN-initiated fish in 1% groundwater by volume (α = 0.0061); fish not initiated in 1% groundwater by volume (α = 0.0101); DEN-initiated fish in 5% groundwater by volume (α = 0.0296); DEN-initiated fish in 25% groundwater by volume (α = 0.0017); and fish not initiated in 25% groundwater by volume (α = 0.0009).

In the split plot analysis of standard length at 6 months, there was marginal evidence (α = 0.0499) that a 3-way interaction of concentration x DEN x sex may be important. The interactions, which are given in Appendix 56, were caused primarily by two groups of females. With the exception of the DEN-initiated control males (α = 0.1284), the DEN-initiated control females were longer than the males and females in all DEN (DEN-initiated and fish not initiated) and concentration (0, 1, 5, and 25% groundwater by volume) groups. In contrast, the control females not initiated were shorter than the males and females in all groups with the exception of the DEN-initiated males in 1% groundwater by volume (α = 0.3847), males not initiated in 1% groundwater by volume (α = 0.0724) DEN-initiated females in 25% groundwater by volume (α = 0.4302), and the DEN-initiated males in 25% groundwater by volume (α = 0.0621).

The linear contrasts within the split plot analysis for the controls at the APG-EA test site vs. the controls held at CEHR showed that the fish held at APG-EA were significantly larger at 6 months in both weight wet (α = 0.0001) and standard length (α = 0.0001).

The following wet weight results were found at 9 months. The whole plot treatments showed that diluent water (APG-EA water vs. West Branch of Canal Creek water) and concentration (0, 1, 5, and 25% groundwater by volume) effects occurred. The fish held in APG-EA water were significantly (α = 0.0030) heavier than the fish held in West Branch of Canal Creek water (Appendix 56). The concentration effect showed that the fish in 25% groundwater by volume were heavier than control fish (α = 0.0210) and fish held in 5% groundwater by volume (α = 0.0123) at the whole plot level.

The split plot analysis for wet weight at 9 months showed that four different interactions occurred with sex (Appendix 56). 1) The females were significantly (α = 0.0001) larger than the males. 2) A diluent x sex interaction showed that the females in the APG-EA water were significantly larger than the males in APG-EA water (α = 0.0096) and males in West Branch of Canal Creek water (α = 0.0001). The females in West Branch of Canal Creek water were significantly larger (α = 0.0001) than the males in the creek water. The males in APG-EA water were larger than the males in creek water (α = 0.0001). 3) A DEN x sex interaction showed that DEN-initiated females were significantly heavier than DEN-initiated males (α = 0.0001), females not initiated (0.0305), and males not initiated (α = 0.0001). The females not initiated were larger than the DEN-initiated males (α = 0.0002) and males not initiated (α = 0.0017). 4) A 4-way interaction occurred with diluent water x concentration x DEN x sex. A number of statistically significant terms occurred which made the analysis difficult to interpret. The reader is referred to Appendix 56 for more information.

The whole plot analysis of standard length at 9 months showed that the APG-EA fish were significantly (α = 0.0028) longer than the West Branch of Canal Creek fish (Appendix 56). Six sex interactions for standard length occurred at the split plot level at 9 months. 1) Females were significantly (α = 0.0001) longer than males. 2) In a diluent water x sex interaction, APG-EA females were significantly longer than APG-EA males (α = 0.0170) and West Branch of Canal Creek males (α = 0.0001). APG-EA males were significantly longer than West Branch of Canal Creek males (α = 0.0001). West Branch of Canal Creek females were significantly larger than West Branch of Canal Creek males (α = 0.0001). 3) A concentration x sex interaction occurred with 16 statistically significant terms which made the analysis difficult to interpret. The reader is referred to Appendix 56 for more detail. 4) A DEN x sex interaction occurred. DEN-initiated females were longer than DEN-initiated males (α = 0.0001) and males not uninitiated (α = 0.0001). Females not initiated were longer than DEN-initiated males (α = 0.0001) and males not initiated (α = 0.0005). 5) A diluent water x DEN x sex interaction occurred which contained 10 significant terms (Appendix 56). In general terms, the West Branch of Canal Creek DEN-initiated and males not initiated were smaller than fish in the other treatments. 6) A concentration x DEN x sex interaction occurred with a number of significant terms which was difficult to interpret (Appendix 56).

The control fish at the APG-EA test site were significantly larger at 9 months in both weight wet (α = 0.0001) and standard length (α = 0.0001) than the controls held at CEHR (Appendix 56).

5.5.3 Histopathology Analyses

The histopathological findings for the 6- and 9-month exposures are described in detail in the pathology report by EPL (1996). Summaries of the findings at 6 months, 9 months, and a summary comparison at 6 and 9 months are given in Appendix 57. The major conclusions of the histopathology study are given below. The conclusions are taken from the EPL summary comparison at 6 and 9 months.

A comparison of Japanese medaka initiated with DEN and exposed to 0, 1, 5, and 25% groundwater by volume in West Branch of Canal Creek water for six months and APG-EA dechlorinated tap water for the final three months of the study as reported by EPL (Appendix 57) is as follows:

> In general the number of hepatocellular neoplasms observed at nine months was greater than the number observed at six months in both male and female medaka. An exception was that there were fewer hepatocellular neoplasms among Groups 3/4 (control) males at nine months than at six months.
>
> Overall hepatocellular neoplasms were more numerous among males than among females. At six months the number of medaka with a hepatocellular neoplasm(s) was the same in males and females in Groups 7/8 [DEN-initiated fish held in 1% groundwater by volume] and 11/12 [DEN-initiated fish held in 5% groundwater by volume].
>
> At six months among male medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasms. At nine months among male medaka there appeared to be a promotional effect of the groundwater on hepatocellular neoplasia based on the apparently low incidence of hepatocellular neoplasms in controls (one in 17). This low incidence may be spurious in light of the incidence of hepatocellular neoplasms in DEN-initiated control males from the six month sacrifice (7 of 20 fish) and the incidence in DEN-initiated control males in dechlorinated tap water from the nine month sacrifice (8 of 40 fish). If it is speculated that the "one in 17" control incidence probably should have been higher (six to eight) then the conclusions might be that there is a slight groundwater effect on hepatocellular neoplasia at the 25% concentration and that there is a

continuing promotional effect of the Canal Creek water on all groups of males initiated with DEN.

At six months among female medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasia. At six months and nine months among female medaka there was no effect of the groundwater on hepatocellular neoplasia. The number of medaka with hepatocellular neoplasia increased at nine months over six months in all groups and at nine months the incidence was greatest among control Groups 3/4 (8 of 32 affected). This distribution of neoplasms indicates that the promotional effect of the Canal Creek water which was evident at six months was still evident at nine months even though the fish were not exposed to Canal Creek water for the last three months of the study.

A comparison of Japanese medaka initiated with DEN and exposed to 0, 1, 5, and 25% groundwater by volume in APG-EA dechlorinated tap water for six and nine months as reported by EPL (Appendix 57) is as follows:

In general the number of hepatocellular neoplasms observed at nine months was greater than the number observed at six months. An exception was that only one of 17 female medaka at six months had a hepatocellular neoplasm in Groups 19/20 [DEN-initiated fish held in 100% APG-EA tap water] and only one in 30 female medaka at nine months had a hepatocellular neoplasm in Groups 19/20.

Overall, neoplasms were more numerous among males than females. An exception was that at six months one female in Groups 19/20 (controls) had a hepatocellular neoplasm and no males in Groups 19/20 had hepatocellular neoplasia.

At six months among male medaka there was no effect of groundwater on hepatocellular neoplasia. At nine months there appeared to be a promotional effect of the groundwater at 25% concentration on hepatocellular neoplasia in male medaka (12 of 29 fish affected), although eight of 40 control medaka also had hepatocellular neoplasia at nine months.

> At six months among the female medaka there was no effect of groundwater on hepatocellular neoplasia. At nine months there appeared to be a trend of increasing percentage of hepatocellular neoplasms from controls to medaka in 25% groundwater, but the differences between groups in number of neoplasms was not great.

A comparison of Japanese medaka not initiated with DEN and exposed to 0, 1, 5, and 25% groundwater by volume in West Branch of Canal Creek water for six months and APG-EA dechlorinated tap water for the final three months of the study as reported by EPL (Appendix 57) is as follows:

> At six months among male and female medaka there was no effect of either Canal Creek water or groundwater on the incidence of hepatocellular neoplasia. At nine months among the males there was a slight effect of 25% groundwater concentration on the incidence of hepatocellular neoplasia (three of 25 medaka had hepatocellular neoplasia versus one medaka with hepatocellular neoplasia in each of the other three exposure concentrations). At nine months among the females there was no effect of groundwater exposure on hepatocellular neoplasia.

A comparison of Japanese medaka not initiated with DEN and exposed to 0, 1, 5, and 25% groundwater by volume in APG-EA dechlorinated tap water for six and nine months as reported by EPL (Appendix 57) is as follows:

> At six months and at nine months among male and female medaka there was no effect of groundwater on the incidence of hepatocellular neoplasia.

A comparison of Japanese medaka not initiated with DEN and housed in CEHR laboratory well water for six and nine months as reported by EPL (Appendix 57) is as follows:

> At six months there were no hepatocellular neoplasms diagnosed among medaka of either sex. At nine months one hepatocellular adenoma occurred in a female that had been initiated with DEN.

Neoplasms other than hepatocellular neoplasms that occurred during the study as reported by EPL (Appendix 57) are as follows:

Neoplasms other than hepatocellular neoplasms occurred sporadically among male and female medaka with no regard to DEN initiation or the type of diluent water in which medaka were housed. Lymphosarcoma was the most common among these sporadic neoplasms.

Non-neoplastic lesions that occurred during the study as reported by EPL (Appendix 57) are as follows:

A number of non-neoplastic lesions occurred in a variety of tissues in both male and female medaka housed in Canal Creek water, dechlorinated tap water or laboratory well water. There was an interesting association of the occurrence of hyaline material in the glomeruli of the kidney in medaka that also had hepatocellular neoplasia, although these two lesions did not consistently occur together in the same fish. Tubular dilatation and tubular casts were common changes in the kidney that occurred more frequently among male medaka than among female medaka. Tubular degeneration and tubular mineralization, when they occurred, usually were in medaka that also had tubular casts and/or tubular dilatation.

Metazoan parasites, usually associated with granulomas, were present in a variety of tissues only in medaka that were exposed to Canal Creek water. This finding is not unexpected in fish exposed to a natural surface water which would harbor such organisms.

Increased basophilia of thyroid tissue was consistently more common among male medaka than among female medaka regardless of diluent water type or exposure to groundwater. Among medaka housed in Canal Creek water for six months and then dechlorinated tap water for three months, 19% of the females had increased basophilia of thyroid tissue although it was usually of minimal severity. This percentage in females, however, was higher than the percentage incidence in females housed in dechlorinated tap water or laboratory well water for six or nine months or in Canal Creek water for six months.

A common gross observation made at necropsy among female medaka was a large, or inflamed,

or swollen anal passage or opening. At gross trimming these observations were related to a bulge of tissue in the area of the anus identified as the urinogenital papillae, an anatomic sex characteristic of female medaka. Histologically, the urinogenital papillae of a number of fish were notably larger than in others and diagnoses of hypertrophy and/or hyperplasia of the covering epithelium were made. Enlarged urinogenital papillae were noted grossly more often in medaka exposed to Canal Creek water for six months and then to dechlorinated tap water for the last three months of the study than in medaka exposed to dechlorinated tap water for nine months. There was no relationship of incidence of enlargement of urinogenital papillae to groundwater of DEN exposure. It is known that the size of the papillae may vary with the breeding season of medaka, and, experimentally, that the size may be altered by exposure to female or male hormones. An explanation for the greater incidence of enlarged papillae in medaka exposed to Canal Creek water than in medaka exposed to dechlorinated tap water is not readily apparent.

Lesions occurred in other tissues not discussed in this summary. [Additional information is given in Appendix 57 and in the EPL pathology report (EPL, 1996).]

Few, if any, data are available on the potential carcinogenicity of heavy metals to the Japanese medaka (Hawkins, 1994). Beryllium and nickel have been classified by the International Agency for Research in Cancer (IARC) as probable carcinogens in mammalian models (Forum for Scientific Excellence, Inc., 1990). As in the case of metals, short-chain halogenated hydrocarbons have received little study in fish relative to other organic groups, e.g., nitroso compounds, polynuclear aromatic hydrocarbons, and aromatic amines (Hawkins et al., 1995). 1,1,2,2-Tetrachloroethane was not found to be carcinogenic to Japanese medaka exposed to concentrations up to 14 mg/L in a study by Hawkins (1991). IARC and the National Toxicology Program (NTP) have listed carbon tetrachloride and chloroform in their mammalian carcinogen lists; NTP has also listed 1,2-dichloroethane (Forum for Scientific Excellence, Inc., 1990).

One may speculate that the low incidence of carcinogenic activity in fish not initiated with DEN may be the result of the concentrations of potential carcinogens in the groundwater being too low to induce neoplasms and/or the fish model does not

respond to chlorinated aliphatic hydrocarbons and heavy metals which are probable mammalian carcinogens.

5.6 Chemical Analyses

5.6.1 Comprehensive Chemical Analyses

A summary of the raw groundwater general water quality, metals, and volatile organics measured in the samples of the five bimonthly comprehensive chemical analyses is given in Table 3. The range of the lowest and highest concentrations of the five analyses is presented. The comprehensive results of each bimonthly chemical analysis are given in Appendix 58. The Appendix is organized as follows. Appendix 58, Table A58-1A lists the 100% groundwater, 100% West Branch of Canal Creek water, and 100% APG-EA tap water results obtained during Test No. 1. Table A58-1B contains the results for the chronic histopathology groundwater exposure aquaria diluted with APG-EA tap water (1, 5, and 25% groundwater by volume aquaria) obtained during Test No. 1. Table A58-1C gives the results for the chronic histopathology groundwater exposure aquaria diluted with West Branch of Canal Creek water (1, 5, and 25% groundwater by volume aquaria) obtained during Test No. 1. Appendix 58, Tables A58-2A to 2C, Tables A58-3A to 3C, Tables A58-4A to 4C, and Tables A58-5A to 5C list the data for Test Nos. 2, 3, 4 and 5, respectively. The tables in Appendix 58 include the test method and detection limit for each chemical. In contrast to Table 3, which contains only the range of materials actually measured in the samples, all materials measured and quantified as well as materials not detected during analysis are included in Appendix 58. The original data sheets and quality control data are archived at the U.S. Army Center for Environmental Health Research (USACEHR, 1994b).

With one exception, no compounds in the following groups were detected in the groundwater, West Branch of Canal Creek water, or APG-EA tap water at EPA's quantitation limits listed in the tables of Appendix 58: 1) priority pollutant base neutrals; 2) organophosphorus pesticides; or 3) chlorinated pesticides and herbicides. Bis-(2-ethylhexyl) phthalate was reported as an analyte in Test No. 5 only for the 5% groundwater by volume aquaria diluted with West Branch of Canal Creek water. The value appears to be spurious because the compound was not listed for the 1% groundwater by volume aquaria or the 100% West Branch of Canal Creek water which was used as the diluent water.

The following munitions were not detected in any sample at a quantitation limit of 50 μg/L: 1) octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX); 2) hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); 3) 1,3,5-trinitrobenzene (TNB); 4) N,2,4,6-tetranitro-N-methylaniline (tetryl); 5) trinitrotoluene (TNT); 6) 2,4-dinitrotoluene (2,4-DNT)); or 7) 2,6-dinitro-toluene (2,6-DNT).

The general water chemistry parameters of the groundwater summarized in Table 3 show that the groundwater has a hardness that ranges from 58 to 66 mg/L as $CaCO_3$. The pH of 3.6-4.3 is low relative to that which occurs in most surfaces waters. Some surface waters high in tannic acid or those waters impacted by acid rain may also have pH values in the same range (Baker et al., 1990). Ammonia nitrogen was <0.1 mg/L in all samples; thus, nonionized ammonia would not be expected to play a role in toxicity (Thurston et al., 1979).

Several EPA priority pollutant heavy metals were found in the groundwater (Table 3). Copper, mercury, and silver concentrations in the groundwater exceeded in one or more tests the EPA freshwater chronic numerical water quality criteria of 12 µg/L for copper (U.S. EPA, 1984a), 0.012 µg/L for mercury (U.S. EPA, 1984b), and the proposed criterion of 0.92 µg/L for silver (U.S. EPA, 1987). The copper and silver criteria are hardness dependent criteria; 100 mg/L as $CaCO_3$ was used. Aluminum was also present at high concentrations in the groundwater; however, EPA has not finalized their draft numerical water quality criteria for the metal (Potts, 1994). Thus, it is not clear whether or not the concentrations in the groundwater may exceed EPA's numerical water quality criteria for aluminum.

Thirteen chlorinated aliphatic compounds were found in the groundwater (Table 3). Several of the organics were EPA priority pollutants. None of the priority pollutant organics found in the groundwater currently have numerical water quality criteria values because insufficient data exist to develop criteria (Potts, 1994). EPA does give the LOEC for several of the compounds where criteria are not available (carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, and 1,1,2-trichloroethane). However, all of the LOECs are one or more orders of magnitude higher than the concentrations found in the groundwater.

Eleven of the 13 volatile organics found in the groundwater had octanol water partition coefficients (log k_{ow} or log P) less than 3 (Table 4). Bioaccumulation of a material up to 100-fold above background (bioconcentration factor or BCF = 100) can occur when the log K_{ow} = 3 (U.S. EPA, 1991b). Thus, bioaccumulation was not a potential toxicological problem for 11 of the 13 volatile organics present in the groundwater. 1,2-Dichlorobenzene and 1,2,4-trichlorobenzene have K_{ows} of 3.4 and 4.2, respectively (Table 4). Both compounds were found in only one groundwater sample (Appendix 58; Table A58-1A). Because the two compounds were reported to be present in only one sample at the beginning of the study, it is difficult to determine how important bioaccumulation may be for the compounds.

TABLE 4. LOG OCTANOL WATER PARTITION COEFFICIENTS OF THE ORGANIC CONTAMINANTS DETECTED IN WELL CC-27B

Contaminant	Log k_{ow}
Bromochloromethane	1.4[a]
Bromodichloromethane	2.1[b]
Carbon Tetrachloride	2.8[c]
Chloroform	1.9[b]
1,2-Dichlorobenzene	3.4[b]
1,2-Dichloroethane	1.4[a]
cis-1,2-Dichloroethene	1.8[c]
1,1,2,2-Tetrachloroethane	2.4[b]
Tetrachloroethene	2.9[b]
1,2,4-Trichlorobenzene	4.2[b]
1,1,1-Trichloroethane	2.5[b]
1,1,2-Trichloroethane	2.2[b]
Trichloroethene	2.4[b]

[a] Value taken from Howard (1993).
[b] Value taken from U.S. EPA (1991a).
[c] Value taken from Howard (1990).

5.6.2 Routine Water Quality Analyses

The raw data and various descriptive statistics for the routine water quality parameters measured in each exposure tank during the chronic histopathology study are given in Appendix 59. Although some of the water quality parameters varied slightly as a function of the treatments, water quality within a given treatment was quite consistent over the 9-month study. The average temperature of all 16 West Branch of Canal Creek test aquaria over the 9-month exposure period was 23.6 vs. 24.2°C for the 16 APG-EA aquaria. The average temperature of both the West Branch of Canal Creek and APG-EA test systems fell within the range of 25 ±2 °C required in the study protocol (USACEHR, 1994a). The average dissolved oxygen concentration of all 16 West Branch of Canal Creek test aquaria over the 9-month exposure period was 7.4 vs. 8.2 mg/L for the 16 APG-EA aquaria. pH ranged from a low of 5.8 at 25% groundwater by volume to a high of 7.9 in the 100% West Branch of Canal Creek test aquaria. In the APG-EA aquaria, pH ranged from a low of 5.8 at 25% groundwater by volume to a high of 7.9 in the 1% groundwater by volume aquaria.

SECTION 6

CONCLUSIONS

The primary objective of this study was to evaluate the potential toxicity of the groundwater *in situ* to aquatic organisms. Although microorganisms are the primary organisms present in most subsurface environments, an array of surrogate biomonitoring systems integrated into a tiered hazard framework was used in the evaluation. An array of biomonitoring assays covering several levels of biological complexity was used to maximize predictability of potential adverse pollutant effects to aquatic organisms during the 9-month evaluation. A secondary objective of the study was to evaluate, where test systems were appropriate for use in low salinity waters, the potential toxicity of West Branch of Canal Creek water. The West Branch of Canal Creek studies were conducted concurrently with the groundwater studies to obtain background data on the potential toxicity of the creek water. Only aqueous phase assays were used in the water column studies of West Branch of Canal Creek water; no sediment systems were studied.

Several U.S Environmental Protection Agency (EPA) priority pollutant heavy metals were found in the groundwater. Copper, mercury, and silver concentrations in the groundwater exceeded, in one or more tests, EPA's numerical water quality criteria for the specific metal. Aluminum was also present at high concentrations in the groundwater; however, EPA has not finalized their draft numerical water quality criteria for the metal. Thus, it is not clear whether or not the concentrations in the groundwater may exceed EPA's numerical water quality criteria for aluminum.

Thirteen chlorinated aliphatic compounds were found in the groundwater, several of which are EPA priority pollutants. None of the priority pollutant organics found in the groundwater currently have numerical water quality criteria values; however, lowest observed effect levels (LOEL) for several of the compounds are available. All of the LOELs are one or more orders of magnitude higher than the concentrations found in the groundwater.

Eleven of the 13 volatile organics found in the groundwater had octanol water partition coefficients (log k_{OW} or log P) less than 3. Thus, bioaccumulation was not a potential toxicological problem for most of the volatile organics present in the groundwater. 1,2-Dichlorobenzene and 1,2,4-trichlorobenzene, which have K_{OWS} greater than 3, were found in only one groundwater sample during the study. Because the two compounds were present in only one sample at the beginning of the study, it is difficult to determine how important bioaccumulation may be for the compounds.

An array of eight biomonitoring systems integrated into a tiered hazard framework was used in the 9-month study. The biomonitoring systems included a number of endpoints. The pH of the groundwater from well CC-27B was ≈4; thus, many of the assays were conducted at both pH 4 and pH 7. The toxicity at pH 7 was studied so that the data could be used, if necessary, in the Phase 2 hazard assessment of the groundwater as it enters the West Branch of Canal Creek which has pH values close to the neutral range.

Toxicity was detected at various groundwater concentrations by 6 of the 8 biomonitoring systems. The Ames assay for mutagenicity was negative in all cases for groundwater, West Branch of Canal Creek water, and filtered APG-EA tap water. Three chemical mutagens (carbon tetrachloride, 1,2-dichloroethane, and trichloroethene) were found in the groundwater. The lack of mutagenic activity in the groundwater concentrated 100X suggests that the concentrations of the mutagens are too low to induce significant mutations in the Ames assay.

Differences in Japanese medaka (Oryzias latipes) growth were found in a chronic 9-month histopathology assay when the fish were exposed to 1, 5 and 25% groundwater by volume diluted with either APG-EA dechlorinated tap water or West Branch of Canal Creek surface water. In general, the fish were smaller when grown in groundwater diluted with West Branch of Canal Creek water compared to those reared in groundwater diluted with APG-EA dechlorinated tap water. Most females were larger than males when reared in groundwater diluted with either West Branch of Canal Creek water or APG-EA dechlorinated tap water.

Experimental Pathology Laboratories, Inc. (EPL), Herndon, VA, analyzed the Japanese medaka in the chronic nine-month study for incidences of hepatocellular neoplasia, neoplasms other than hepatocellular neoplasms, and non-neoplastic lesions and concluded the following. "...at nine months among male and female medaka there was no effect of groundwater on the incidence of hepatocellular neoplasia [at concentrations up to 25% groundwater by volume (highest concentrations studied) when APG-EA dechlorinated tap water was used as diluent water]." "At nine months among the males there was a slight effect of 25% groundwater concentration on the incidence of hepatocellular neoplasia...[and]...among the females there was no effect of groundwater exposure on hepatocellular neoplasia [when West Branch of Canal Creek water was used as diluent water for six months and dechlorinated tap water for three additional months]."

EPL found the following at the end of the nine-month study when Japanese medaka were initiated for 48 h at 13 days of age with 10 mg/L diethylnitrosamine (DEN). "At nine months there appeared to be a promotional effect of the groundwater at 25% concentration on hepatocellular neoplasia in male medaka (12 of

29 fish affected), although eight of 40 control medaka also had hepatocellular neoplasia at nine months [in fish exposed to 25% groundwater by volume diluted with APG-EA dechlorinated tap water]." "At nine months there appeared to be a trend of increasing percentage of hepatocellular neoplasms from controls in 25% groundwater, but the differences between groups in number of neoplasms was not great."

In DEN-initiated fish exposed to West Branch of Canal Creek water for six months followed by three months of exposure to groundwater in APG-EA dechlorinated tap water, EPL concluded "At nine months among male medaka there appeared to be a promotional effect of the groundwater on hepatocellular neoplasia based on the apparently low incidence of hepatocellular neoplasms in controls...This low incidence may be spurious..." "At six months among female medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasia. At six and nine months among female medaka there was no effect of the groundwater on hepatocellular neoplasia. The number of medaka with hepatocellular neoplasia increased at nine months over six months in all groups and at nine months the incidence was greatest among control Groups..."

The groundwater was acutely toxic at pH 4 to a green alga (*Selenastrum capricornutum*), cladoceran (*Ceriodaphnia dubia*), fathead minnow (*Pimephales promelas*), and Japanese medaka. From an acute toxicity standpoint, the groundwater appeared to be less toxic to the green alga at pH 7. The groundwater was not acutely toxic at pH 7 to the cladoceran, fathead minnow, or Japanese medaka.

The lowest concentration of groundwater that caused no observable adverse effect (NOEC) at pH 4, in the test systems in which the NOEC value could be determined, was 10% groundwater by volume. A NOEC of 10% groundwater by volume occurred in 3 out of 5 tests for the green alga (*S. capricornutum*); 4 out of 5 tests in both a 7-d cladoceran (*C. dubia*) and a 96-h frog (*Xenopus laevis*) embryo teratogenesis assay - *Xenopus* (FETAX). A NOEC of 18% groundwater by volume occurred in 2 of 5 tests in a 7-d fathead minnow (*P. promelas*) test. The groundwater was not toxic at pH 7 in the 7-d fathead minnow test and in 2 of 5 FETAX assays. The NOEC (18% groundwater by volume) was higher at pH 7 in 3 of the 5 FETAX assays. The 10% groundwater by volume NOEC for the green alga and cladoceran at pH 4, however, was essentially the same when the organisms were exposed to buffered groundwater at pH 7.

In conclusion, 6 of the 8 biomonitoring systems showed that the groundwater in the Canal Creek aquifer was toxic. Thus, the Phase 2 analyses followed by the preliminary hazard assessment of the groundwater discharge into West Branch of Canal Creek should be conducted as proposed.

SECTION 7

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APPENDIX 1

MICROTOX® ASSAYS CONDUCTED ON RAW (pH ≈4.0) CANAL CREEK GROUNDWATER (WELL CC-27B), CHRONIC HISTOPATHOLOGY EXPOSURE TANKS, AND APG-EA DILUENT WATER (AUGUST 12, 1994 - MAY 10, 1995)

TABLE A1-1. MICROTOX® TEST RESULTS ON GRAB SAMPLES OF CANAL CREEK 100% GROUNDWATER FROM WELL CC-27B[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	53.4	27.59-103.23	0.77	-		
	17	50.1	15.28-164.40	0.66	-		
	19	49.8	24.77-100.19	0.89	-		
	22	49.0	37.75-63.73	0.68	-		
	24	65.6	31.14-138.18	0.50	-		
	26	50.0	35.22-70.96	0.56	-		
	29	41.3	23.17-73.66	0.62	-		
	31	59.4	41.04-86.07	0.67	-		
Sep	02	42.5	30.56-59.08	0.94	-		
	05	41.1	32.13-52.50	0.78	-		
	07	43.6	17.29-109.87	0.64	-		
	09	28.7	20.34-40.51	0.83	-		
	12	22.6	19.50-26.09	0.78	36.6	07.67-175.02	1.14
	14	[b]			[b]		
	15	40.5	38.74-42.29	0.57	49.4	07.38-330.21	0.71
	19	20.4	16.85-24.59	0.93	31.9	08.33-122.58	0.97
	21	70.9	16.47-305.56	0.54	-		
	23	47.3	20.46-109.55	0.55	-		
	26	32.1	22.10-46.76	0.52	72.8	26.33-201.36	0.92
	27	38.2	25.09-58.30	0.63	71.2	28.64-177.15	1.07
	28	36.1	22.39-58.34	0.55	65.1	04.07-1042.11	0.80
Oct	03	27.3	21.83-34.10	0.66	71.5	02.15-2370.13	0.75
	05	48.5	26.02-90.20	0.62	-		
	07	47.6	31.93-70.88	0.73	-		
	10	37.7	21.64-65.67	0.72	47.1	00.43-5144.86	0.63
	12	56.0	42.80-73.22	0.60	-		
	14	51.7	29.24-91.58	0.51	-		
	17	38.6	15.60-95.65	0.56	-		
	18	23.4	19.36-28.24	0.61	46.1	10.61-200.19	0.86

TABLE A1-1. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Oct	21	48.5	27.58-85.43	0.58	-		
	24	45.2	18.04-113.15	0.54	-		
	26	34.3	26.18-45.01	0.62	63.3	04.49-893.12	0.89
	28	57.1	19.63-166.35	0.55	-		
	31	39.8	22.08-72.04	0.71	-		
Nov	01	44.0	26.15-74.07	0.69	-		
	02	34.9	23.87-50.89	0.69	61.7	00.86-4423.97	0.57
	07	61.5	32.93-114.92	0.71	-		
	08	51.6	30.66-86.70	0.55	60.9	00.42-8871.74	0.46
	09	-			-		
	14	36.1	27.51-47.26	0.66	79.3	01.08-5843.29	0.52
	15	-			-		
	16	40.4	24.42-66.76	0.65	-		
	21	35.2	27.89-44.35	0.66	-		
	22	51.2	13.36-196.46	0.61	-		
	23	42.3	41.54-43.02	0.72	45.2	00.32-6462.52	0.54
	28	35.0	25.28-48.46	0.56	68.5	01.41-3318.80	0.74
	29	46.0	37.30-56.79	0.71	-		
	30	34.4	19.94-59.48	0.77	51.7	00.40-6638.08	0.60
Dec	05	27.8	22.40-34.48	0.71	52.4	03.62-758.69	0.70
	07	32.2	22.32-46.34	0.64	61.0	00.39-9581.55	0.50
	08	37.4	17.47-80.10	0.76	53.8	00.27-510659.46	0.54
	12	51.7	19.34-138.11	0.69	40.4	00.17-9707.44	0.48
	13	35.7	24.27-52.38	0.64	48.9	00.20-512123.31	0.38
	14	31.2	24.81-39.11	0.75	71.6	01.53-3352.52	0.67
	19	30.9	18.81-50.94	0.83	67.2	01.42-3172.49	0.63
	20	26.2	21.28-32.18	0.79	54.9	16.89-178.14	0.68
	21	41.4	14.51-118.21	0.76	-		
	26	35.2	21.68-57.28	0.63	56.0	04.26-736.56	1.00
	27	41.7	31.23-55.71	0.65	71.4	26.95-189.02	1.47

TABLE A1-1. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Dec	28	36.0	18.09-71.84	0.61	70.8	13.30-377.32	0.91
Jan	02	30.4	15.72-58.59	0.72	63.1	05.63-707.49	0.67
	03	55.9	25.57-122.07	0.54	67.5	00.45-10172.60	0.56
	04	33.6	17.55-64.26	0.60	77.9	08.27-733.05	0.88
	09	-			-		
	10	46.3	29.99-71.33	0.66	63.1	00.71-5594.45	0.63
	11	-			-		
	16	40.3	24.82-65.46	0.56	72.7	01.38-3827.20	0.65
	17	53.1	26.33-106.94	0.56	-		
	18	32.8	22.07-48.79	0.70	88.4	29.81-262.02	1.00
	23	56.0	16.90-185.66	0.55	-		
	24	44.5	36.71-53.92	0.56	-		
	25	42.4	24.11-74.51	0.86	-		
	30	-			-		
	31	21.8	09.52-49.71	1.20	47.8	36.39-62.70	1.19
Feb	01	54.6	25.66-116.13	0.53	36.0	00.03-43150.13	0.22
	06	32.5	19.10-55.42	0.71	45.5	00.87-2392.37	0.67
	08	19.5	13.56-27.91	0.83	48.4	13.67-171.49	0.69
	09	24.9	21.14-29.26	0.69	53.4	04.85-587.92	0.74
	13	-			-		
	15	37.1	10.23-134.41	0.99	-		
	16	32.1	19.26-53.65	0.71	-		
	20	68.5	51.28-91.43	0.61	-		
	21	31.6	30.72-32.50	0.69	87.9	00.66-11546.9	0.43
	22	32.9	22.22-48.78	0.72	50.3	00.33-7701.6	0.55
	27	30.4	21.72-46.68	0.75	43.7	00.14-13567.1	0.36
	28	35.9	31.74-40.78	0.84	55.2	00.08-39023.8	0.33
Mar	01	32.7	25.42-41.96	0.82	77.5	00.30-20309.3	0.44
	06	30.8	27.86-33.98	0.93	64.2	00.85-6384.5	0.44
	07	36.3	24.17-54.45	0.81	44.7	00.09-21399.1	0.37

TABLE A1-1. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Mar	08	54.4	21.08-130.22	0.71	-		
	13	28.6	25.67-31.84	1.02	57.2	04.93-662.56	0.82
	14	35.3	17.13-72.84	0.92	49.4	00.96-2546.51	0.51
	15	42.7	26.10-69.90	0.91	48.1	00.09-25909.87	0.42
	20	42.5	28.74-62.70	1.20	-		
	21	40.2	34.86-46.92	0.78	72.1	00.33-15880.30	0.47
	22	32.1	24.27-42.34	0.97	55.3	01.39-2193.24	0.66
	27	28.5	22.52-36.16	1.04	53.5	03.74-764.33	0.75
	28	-			-		
	29	31.4	18.72-52.65	1.00	52.8	01.38-2022.36	0.64
Apr	03	27.5	18.31-41.24	1.02	81.5	06.37-1043.03	0.66
	04	34.2	21.53-54.31	1.04	51.1	00.45-5825.49	0.47
	05	34.2	26.28-44.39	1.04	88.2	00.57-13622.21	0.49
	10	33.3	25.21-44.00	1.18	83.0	14.03-491.04	0.85
	11	39.7	30.75-51.24	0.90	61.0	00.24-15657.32	0.46
	12	41.3	29.40-57.99	0.91	38.5	00.01-253720.69	0.17
	17	30.9	27.65-34.53	1.05	60.9	01.27-2930.49	0.64
	18	31.6	19.26-51.84	1.34	57.3	06.34-517.29	0.98
	19	33.4	20.72-53.94	1.17	63.9	03.02-1350.00	0.68
	24	32.9	16.84-65.54	0.94	38.7	00.59-2503.10	0.57
	25	31.1	13.46-72.04	1.20	55.5	03.30-933.90	
	26	18.7	00.88-396.56	0.12	-		
May	01	29.1	16.78-50.30	0.95	44.6	01.55-1278.94	0.56
	02	26.0	23.59-28.59	0.99	51.2	04.83-541.42	0.70
	03	30.2	28.10-32.38	1.05	58.7	02.18-1577.79	0.58
	08	40.0	12.27-130.52	0.72	41.9	00.15-11894.78	0.31
	09	-			-		
	10	38.9	13.30-114.01	0.98	42.9	00.46-4053.34	0.50

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.

TABLE A1-2. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 25% GROUNDWATER FROM WELL CC-27B DILUTED BY APG-EA DECHLORINATED TAP WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	-			-		
	06	-			-		
	10	-			-		
	12	-			-		
	14	-			-		
	17	-			-		
	18	-			-		

TABLE A1-2. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Oct	21	-			-		
	24	-			-		
	26	-			-		
	28	-			-		
	31	-			-		
Nov	01	-			-		
	02	-			-		
	07	-			-		
	08	-			-		
	09	-			-		
	14	-			-		
	15	-			-		
	16	-			-		
	21	-			-		
	22	-			-		
	23	-			-		
	28	-			-		
	29	-			-		
	30	-			-		
Dec	05	-			-		
	07	-			-		
	08	-			-		
	12	-			-		
	13	-			-		
	14	-			-		
	19	-			-		
	20	-			-		
	21	-			-		
	26	-			-		
	27	-			-		

TABLE A1-2. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Dec	28	-			-		
Jan	02	-			-		
	03	-			-		
	04	-			-		
	09	-			-		
	10	-			-		
	11	-			-		
	16	-			-		
	17	-			-		
	18	-			-		
	23	-			-		
	24	-			-		
	25	-			-		
	30	-			-		
	31	-			-		
Feb	01	-			-		
	06	-			-		
	08	-			-		
	09	-			-		
	13	-			-		
	15	-			-		
	16	-			-		
	20	-			-		
	21	-			-		
	22	-			-		
	27	-			-		
	28	-			-		
Mar	01	-			-		
	06	-			-		
	07	-			-		

TABLE A1-2. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
	08	-			-		
	13	-			-		
	14	-			-		
	15	-			-		
	20	-			-		
	21	-			-		
	22	-			-		
	27	-			-		
	28	-			-		
	29	-			-		
Apr	03	-			-		
	04	-			-		
	05	-			-		
	10	-			-		
	11	-			-		
	12	-			-		
	17	-			-		
	18	-			-		
	19	-			-		
	24	-			-		
	25	-			-		
	26	-			-		
May	01	-			-		
	02	-			-		
	03	-			-		
	08	-			-		
	09	-			-		
	10	-			-		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.

TABLE A1-3. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 5% GROUNDWATER FROM WELL CC-27B DILUTED BY APG-EA DECHLORINATED TAP WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	c			c		

a EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
b Test not conducted due to mechanical problem in biomonitoring trailer water system.
c Assays were discontinued after the first 1.5 months of study because no toxicity was detected at 5% groundwater by volume.

TABLE A1-4. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 1% GROUNDWATER FROM WELL CC-27B DILUTED BY APG-EA DECHLORINATED TAP WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	c			c		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.
[c] Assays were discontinued after the first 1.5 months of study because no toxicity was detected at 1% groundwater by volume.

TABLE A1-5. MICROTOX® TEST RESULTS ON COMPOSITE AND GRAB SAMPLES OF 100% WEST BRANCH OF CANAL CREEK WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	-			-		
	06	-			-		
	10	-			-		
	12	-			-		
	14	-			-		
	17	-			-		
	18	-			-		

TABLE A1-5. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Oct	21	-			-		
	24	-			-		
	26	-			-		
	28	-			-		
	31	-			-		
Nov	01	-			-		
	02	-			-		
	07	-			-		
	08	-			-		
	09	-			-		
	14	-			-		
	15	-			-		
	16	-			-		
	21	-			-		
	22	-			-		
	23	-			-		
	28	-			-		
	29	-			-		
	30	-			-		
Dec	05	-			-		
	07	-			-		
	08	-			-		
	12	c			c		
	13	c			c		
	14	c			c		
	19	-			-		
	20	-			-		
	21	-			-		
	26	c			c		
	27	-			-		

TABLE A1-5. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Dec	28	-			-		
Jan	02	-			-		
	03	-			-		
	04	-			-		
	09	c			c		
	10	-			-		
	11	-			-		
	16	-			-		
	17	-			-		
	18	-			-		
	23	-			-		
	24	-			-		
	25	-			-		
	30	-			-		
	31	c			c		
Feb	01	-			-		
	06[d]	-			-		
	08	-			-		
	09	-			-		
	13	-			-		
	15	-			-		
	16	-			-		
	20	-			-		
	21	-			-		
	22	-			-		
	27	-			-		
	28	-			-		
Mar	01	-			-		
	06	-			-		
	07	-			-		

TABLE A1-5. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Mar	08	-			-		
	13	-			-		
	14	-			-		
	15	-			-		
	20	-			-		
	21	-			-		
	22	-			-		
	27	-			-		
	28	-			-		
	29	-			-		
Apr	03	-			-		
	04	-			-		
	05	-			-		
	10	-			-		
	11	-			-		
	12	-			-		
	17	-			-		
	18	-			-		
	19	-			-		
	24	-			-		
	25	-			-		
	26	-			-		
May	01	-			-		
	02	-			-		
	03	-			-		
	08	-			-		
	09	-			-		
	10	-			-		

TABLE A1-5. (CONTINUED)

Date of Sample	Microtox® 5-Min Readings			Microtox® 15-Min Readings		
	5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope

[a] EC50s and 95% fiducial limits are expressed as percent West Branch of Canal Creek water by volume.

[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.

[c] West Branch of Canal Creek water system not operational because delivery lines froze (See Section 4.2.1 for explanation).

[d] Grab sample taken directly from West Branch of Canal Creek beginning February 5, 1995 (See Section 4.2.1 for explanation).

TABLE A1-6. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 25% GROUNDWATER FROM WELL CC-27B DILUTED BY WEST BRANCH OF CANAL CREEK WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	–			–		
	17	–			–		
	19	–			–		
	22	–			–		
	24	–			–		
	26	–			–		
	29	–			–		
	31	–			–		
Sep	02	–			–		
	05	–			–		
	07	–			–		
	09	–			–		
	12	–			–		
	14	b			b		
	15	–			–		
	19	–			–		
	21	–			–		
	23	–			–		
	26	–			–		
	27	–			–		
	28	–			–		
Oct	03	–			–		
	05	–			–		
	06	–			–		
	10	–			–		
	12	–			–		
	14	–			–		
	17	–			–		
	18	–			–		

TABLE A1-6. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Oct	21	-			-		
	24	-			-		
	26	-			-		
	28	-			-		
	31	-			-		
Nov	01	-			-		
	02	-			-		
	07	-			-		
	08	-			-		
	09	-			-		
	14	-			-		
	15	-			-		
	16	-			-		
	21	-			-		
	22	-			-		
	23	-			-		
	28	-			-		
	29	-			-		
	30	-			-		
Dec	05	-			-		
	07	-			-		
	08	-			-		
	12	c			c		
	13	c			c		
	14	c			c		
	19	-			-		
	20	-			-		
	21	-			-		
	26	c			c		
	27	-			-		

TABLE A1-6. (CONTINUED)

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Dec	28	-			-		
Jan	02	-			-		
	03	-			-		
	04	-			-		
	09	c			c		
	10	-			-		
	11	-			-		
	16	-			-		
	17	-			-		
	18	-			-		
	23	-			-		
	24	-			-		
	25	-			-		
	30	-			-		
	31	c			c		
Feb	01	-			-		
	05[d]	-			-		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.
[c] West Branch of Canal Creek water system not operational because delivery lines froze (See Section 4.2.1 for explanation).
[d] Assays were discontinued February 5, 1995 because the diluent water was switched from West Branch of Canal Creek water to APG-EA tap water (See Section 4.2.1 for explanation).

TABLE A1-7. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 5% GROUNDWATER FROM WELL CC-27B DILUTED BY WEST BRANCH OF CANAL CREEK WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	c			c		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.
[c] Assays were discontinued after the first 1.5 months of study because no toxicity was detected at 5% groundwater by volume.

TABLE A1-8. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF CANAL CREEK 1% GROUNDWATER FROM WELL CC-27B DILUTED BY WEST BRANCH OF CANAL CREEK WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	-			-		
	17	-			-		
	19	-			-		
	22	-			-		
	24	-			-		
	26	-			-		
	29	-			-		
	31	-			-		
Sep	02	-			-		
	05	-			-		
	07	-			-		
	09	-			-		
	12	-			-		
	14	b			b		
	15	-			-		
	19	-			-		
	21	-			-		
	23	-			-		
	26	-			-		
	27	-			-		
	28	-			-		
Oct	03	-			-		
	05	c			c		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] Test not conducted due to mechanical problem in biomonitoring trailer water system.
[c] Assays were discontinued after the first 1.5 months of study because no toxicity was detected at 1% groundwater by volume.

TABLE A1-9. MICROTOX® TEST RESULTS ON COMPOSITE GRAB SAMPLES OF 100% APG-EA TAP WATER[a]

Date of Sample		Microtox® 5-Min Readings			Microtox® 15-Min Readings		
		5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	17	-			-		
	24	-			-		
	31	-			-		
Sep	07	-			-		
	15	-			-		
	21	-			-		
	27	-			-		
Oct	05	-			-		
	12	-			-		
	18	-			-		
	24	-			-		
	31	-			-		
Nov	07	-			-		
	14	-			-		
	21	-			-		
	28	-			-		
Dec	05	-			-		
	12	-			-		
	19	-			-		
	26	-			-		
Jan	03	-			-		
	09	-			-		
	16	-			-		
	23	-			-		
	30	-			-		
Feb	06	-			-		
	13	-			-		
	20	-			-		
	27	-			-		
Mar	06	-			-		

TABLE A1-9. (CONTINUED)

Date of Sample	Microtox® 5-Min Readings			Microtox® 15-Min Readings		
	5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Mar 13	-			-		
20	-			-		
27	-			-		
Apr 03	-			-		
10	-			-		
17	-			-		
24	-			-		
May 01	-			-		
08	-			-		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.

TABLE A1-10. MICROTOX® TEST RESULTS ON GRAB SAMPLES OF WEST BRANCH OF CANAL CREEK WATER[a]

Date of Sample	Microtox® 5-Min Readings			Microtox® 15-Min Readings		
	5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Sep 02	-			-		
09	-			-		
23	-			-		
28	-			-		
Oct 06	-			-		
12	-			-		
17	-			-		
24	-			-		
Nov 05	[b]			[b]		

[a] EC50s and 95% fiducial limits are expressed as percent West Branch of Canal Creek water by volume.

[b] Assays were discontinued after 2 months of study because no toxicity was detected in the West Branch of Canal Creek water entering the biomonitoring facility before being split in the serial dilutor for distribution to the Japanese medaka West Branch of Canal Creek test aquaria.

APPENDIX 2

MICROTOX® ASSAYS CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) AND pH OF SAMPLES USED IN ASSAYS (AUGUST 12, 1995 - MAY 10, 1995)

TABLE A2-1. MICROTOX® TEST RESULTS ON GRAB SAMPLES OF CANAL CREEK BUFFERRED 100% GROUNDWATER FROM WELL CC-27B[a]

Date of Sample		Rep	Microtox® 5-Min Readings			Microtox® 15-Min Readings		
			5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Aug	15	1	-			-		
	22	1	-			-		
	29	1	-			-		
Sep	05	1	-			-		
	12	1	37.8[b]			-		
	19	1	-			-		
	26	1	-			-		
Oct	03	1	-			-		
	10	1	-			-		
	17	1	-			-		
	26	1	-			-		
Nov	02	1	-			-		
	07	1	-			-		
	15	1	-			-		
	21	1	-			-		
	28	1	-			-		
Dec	05	1	-			-		
	12	1	-			-		
	19	1	-			-		
	27	1	-			-		
Jan	04	1	-			-		
	10	1	-			-		
	17	1	-			-		
	23	1	-			-		
	30	1	-			-		
Feb	08	1	-			-		
	13	1	-			-		
	20	1	-			-		
	27	1	-			-		

TABLE A2-1. (CONTINUED)

Date of Sample		Rep	Microtox® 5-Min Readings			Microtox® 15-Min Readings		
			5-min EC50	95% Fiducial Limits	Slope	15-min EC50	95% Fiducial Limits	Slope
Mar	06	1	-			-		
	13	1	-			-		
	20	1	-			-		
	27	1	55.6	39.08-78.71	1.60	48.6	38.22-61.68	1.37
Apr	03	1	-			-		
	10	1	-			-		
	17	1	-			-		
	24	1	-			-		
May	01	1	-			-		
	08	1	-			-		

[a] EC50s and 95% fiducial limits are expressed as percent groundwater by volume.
[b] 95% fiducial limits exceeded the limits of the Microtox® probit program; thus, the value is most likely spurious.

TABLE A2-2. pH OF THE RAW AND BUFFERED 100% CANAL CREEK GROUNDWATER (WELL CC-27B) USED IN THE MICROTOX® ASSAY

Date of Sample		Rep	Raw Groundwater	Buffered Groundwater Initial	Buffered Groundwater Final
Aug	15	1	4.11	6.95	6.85
	22	1	4.01	7.01	7.17
	29	1	4.01	7.01	7.19
Sep	05	1	3.98	6.91	7.07
	12	1	3.98	6.85	6.98
	19	1	3.98	7.11	7.21
	26	1	3.97	6.85	7.02
Oct	03	1	4.02	7.01	7.26
	10	1	3.98	7.02	7.28
	17	1	4.08	6.89	7.35
	24	1	4.11	6.88	7.20
Nov	02	1	4.09	7.01	7.29
	07	1	4.06	6.96	7.35
	15	1	4.05	6.89	7.32
	21	1	4.06	7.11	7.68
	28	1	4.06	7.15	8.05
Dec	05	1	4.07	6.93	7.21
	12	1	4.11	6.88	7.53
	19	1	4.10	7.01	7.35
	27	1	4.15	6.84	7.30
Jan	04	1	4.14	6.90	7.44
	10	1	4.13	6.80	7.53
	17	1	4.14	7.01	7.90
	23	1	4.14	6.84	8.03
	30	1	4.12	7.23	7.00
Feb	08	1	4.15	7.23	8.21
	13	1	4.44	7.20	7.56
	20	1	4.14	6.90	7.35
	27	1	4.13	6.85	7.23
Mar	06	1	4.15	7.11	7.57
	13	1	4.18	6.85	6.92
	20	1	4.12	7.06	7.49
	27	1	4.14	6.96	7.52
Apr	03	1	4.16	6.95	7.60
	10	1	4.32	7.03	7.56
	17	1	4.13	7.01	7.42
	24	1	4.17	7.08	7.49
May	01	1	4.14	7.06	7.45
	08	1	4.17	7.02	8.34

APPENDIX 3

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	September 13-17, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	Selenastrum capricornutum
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
Endpoint:	Reduction in growth relative to control

Temperature: 25 ± 0.2 °C

Results:

100% raw Canal Creek groundwater killed all algal cells during the first 24 h of exposure (Table A3-1). Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 18% raw groundwater by volume (see Tables A3-1 and A3-2). Growth was not affected by exposure to 10% raw groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 56.9% raw groundwater by volume (95% confidence limits = 54.51-59.48).

Algal growth was not affected by exposure to APG-EA diluent water relative to the UMD/WREC controls (t-test: critical value = 4.60; t statistic = -0.71; α = 0.01).

TABLE A3-1. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 1) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	8800	79040	340600	690400	1248600
	2	8800	76000	328400	672240	1220220
	3	8800	78000	330400	677400	1236400
APG-EA Diluent Water	1	9020	78600	338600	666240	1260400
	2	9020	75220	328600	652480	1186880
	3	9020	74880	335400	656800	1208400
10	1	8500	80000	330000	660240	1195240
	2	8500	74600	315260	650400	1223260
	3	8500	77200	316840	652400	1190240
18	1	8000	76000	320840	651840	1188240
	2	8000	74400	326640	660000	1199200
	3	8000	72480	314860	648400	1159640
32	1	9600	70000	318800	634000	1159980
	2	9600	74640	324240	639600	1166200
	3	9600	72440	316640	626400	1150400
56	1	8800	64660	298400	540200	918640
	2	8800	70000	299880	555240	958600
	3	8800	66120	294600	538200	910200
100	1	9080	DEAD			
	2	9080	DEAD			
	3	9080	DEAD			

Table A3-2. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - MEAN CELL DENSITY (CELLS/ML)[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	3.14
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	2.16
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	133.95
Alpha value:	0.05
Critical value:	3.48
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A3-3
Alpha value:	0.05
Critical Value:	2.47
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all cells died during the test.

Table A3-3. GREEN ALGAE CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1235073		
10	3	1202913	2.156	
18	3	1182360	3.534	*
32	3	1158860	5.110	*
56	3	929146	20.512	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.47).

APPENDIX 4

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	September 13-17, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	*Selenastrum capricornutum*
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
pH Buffer:	10 N NaOH

Endpoint:	Reduction in growth relative to control
Temperature:	25 ± 0.2 °C

Results:

Significant (α = 0.05) reductions in growth (cell density) occurred in concentrations down to 18% buffered groundwater (See tables A4-1, A4-2, and A4-3). Growth was not affected by exposure to 10% buffered groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 10% buffered groundwater by volume.
LOEC = 18% buffered groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 79.5 buffered groundwater by volume (95% confidence limits = 62.54-111.83).

Table A4-1. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO. 1) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	8800	79040	340600	690400	1248600
	2	8800	76000	328400	672240	1220220
	3	8800	78000	330400	677400	1236400
10	1	9000	77400	336240	686400	1246400
	2	9000	78000	324400	670200	1209200
	3	9000	74200	328400	682400	1238000
18	1	9400	77780	326400	666400	1186240
	2	9400	70400	320120	660880	1193480
	3	9400	74200	323800	661400	1199400
32	1	8600	70200	324840	654800	1157200
	2	8600	72480	320240	644600	1168420
	3	8600	74200	328000	656240	1180200
56	1	9000	65800	304320	603240	1024690
	2	9000	67240	298360	606800	1000100
	3	9000	66400	300100	596400	1020400
100	1	8600	46240	194600	388240	527680
	2	8600	48400	200400	394100	550240
	3	8600	43240	202600	398000	530340

Table A4-2. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - MEAN CELL DENSITY (CELLS/ML)

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.76
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variance:

Calculated test statistic:	1.83
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1215.65
Alpha value:	0.05
Critical value:	3.11
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A4-3
Alpha value:	0.05
Critical value:	2.50
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A4-3. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1235073		
10	3	1231200	0.353	
18	3	1193040	3.831	*
32	3	1168606	6.058	*
56	3	1015063	20.051	*
100	3	536086	63.703	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.50).

APPENDIX 5

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	November 11-15, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	Selenastrum capricornutum
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	$\approx 1 \times 10^4$ cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
Endpoint:	Reduction in growth relative to control

Temperature: 25 ± 0.2 °C

Results:

100% raw Canal Creek groundwater killed all algal cells during the first 24 h of exposure (Table A5-1). Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 18% raw groundwater by volume (see Tables A5-1, A5-2, and A5-3). Growth was not affected by exposure to 10% raw groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 51.9% raw groundwater by volume (95% confidence limits = 48.56-55.64).

No difference in algal growth was detected between the UMD/WREC controls and the APG-EA diluent controls (t-test: critical value = 4.60; t statistic = -4.20; α = 0.01) .

TABLE A5-1. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 2) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	9000	73200	353000	682400	1466200
	2	9000	68400	345600	670100	1450000
	3	9000	70100	350200	675200	1452040
APG-EA Diluent Water	1	8800	71400	346800	669000	1436200
	2	8800	68600	342400	663200	1420800
	3	8800	66800	338600	666666	1422500
10	1	9600	68400	343200	662100	1422400
	2	9600	71100	346100	650400	1406240
	3	9600	66200	340200	655200	1409600
18	1	9050	69000	325600	628400	1335333
	2	9050	64200	317800	613100	1317200
	3	9050	66800	322100	618200	1320200
32	1	9400	66400	303600	587640	1233200
	2	9400	60900	297000	582100	1214200
	3	9400	65400	300400	585500	1218200
56	1	9600	59140	245100	410400	883600
	2	9600	55600	237000	398600	812200
	3	9600	56260	241900	403100	798620
100	1	9200	DEAD			
	2	9200	DEAD			
	3	9200	DEAD			

Table A5-2. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - MEAN CELL DENSITY (CELLS/ML)[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	3.14
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	9.15
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	386.554
Alpha value:	0.05
Critical value:	3.48
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A5-3
Alpha value:	0.05
Critical Value:	2.47
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all cells died during the test.

Table A5-3. GREEN ALGAE CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1456080		
10	3	1412747	2.408	
18	3	1324244	7.325	*
32	3	1221867	13.014	*
56	3	831473	34.705	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.47).

APPENDIX 6

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	November 11-15, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	*Selenastrum capricornutum*
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1×10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
pH Buffer:	10 N NaOH

Endpoint:	Reduction in growth relative to control
Temperature:	25 ± 0.2 °C

Results:

Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 18% buffered groundwater by volume (See Tables A6-1, A6-2, and A6-3). Growth was not affected by exposure to 10% buffered groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 10% buffered groundwater by volume.
LOEC = 18% buffered groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 67.0 buffered groundwater by volume (95% confidence limits = 59.93-77.05).

Table A6-1. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO. 2) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	9000	73200	353000	682400	1466200
	2	9000	68400	345600	670100	1450000
	3	9000	70100	350200	675200	1452040
10	1	8800	69200	357000	695100	1495000
	2	8800	71400	352800	683600	1479200
	3	8800	74300	355100	685200	1481000
18	1	9200	65100	327800	629200	1346000
	2	9200	70000	336100	640100	1364200
	3	9200	67333	333333	634200	1350600
32	1	9600	66100	308000	592200	1265100
	2	9600	61200	300100	580200	1245400
	3	9600	63400	304600	587600	1251100
56	1	9000	57200	248600	458000	865300
	2	9000	52600	245000	424400	821000
	3	9000	51200	239650	430300	826400
100	1	8600	41000	153200	290400	480500
	2	8600	36200	141200	204200	402100
	3	8600	38400	144400	250100	436500

Table A6-2. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - MEAN CELL DENSITY (CELLS/ML)

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.76
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variance:

Calculated test statistic:	7.74
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1250.85
Alpha value:	0.05
Critical value:	3.11
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A6-3
Alpha value:	0.05
Critical value:	2.50
Conclusion:	Reject the null hypothesis that all groups are equal

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TABLE A6-3. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1456080		
10	3	1485067	-1.749	
18	3	1353600	6.182	*
32	3	1253867	12.198	*
56	3	837566	37.309	*
100	3	439700	61.309	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.50).

APPENDIX 7

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	January 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	<u>Selenastrum</u> <u>capricornutum</u>
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
Endpoint:	Reduction in growth relative to control

Temperature: 25 ± 0.2 °C

Results:

100% raw Canal Creek groundwater killed all algal cells during the first 24 h of exposure (Table A7-1). Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 32% raw groundwater by volume (See Tables A7-1, A7-2, and A7-3). Growth was not affected by exposure to 18% raw groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 56.3% raw groundwater by volume (95% confidence limits = 47.17-67.44).

No difference in algal growth was detected between the UMD/WREC controls and the APG-EA diluent controls (t-test: critical value = 4.60; t statistic = -0.76; α = 0.01) .

TABLE A7-1. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 3) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	8800	70200	328900	644800	1211100
	2	8800	67800	321600	631000	1199800
	3	8800	69400	325100	635200	1206200
APG-EA Diluent Water	1	8600	67000	322200	617800	1168300
	2	8600	68900	330100	640100	1227400
	3	8600	69200	326100	630200	1179200
10	1	9000	71800	333333	650100	1217700
	2	9000	69200	322400	630200	1193640
	3	9000	65400	318000	619800	1175560
18	1	9600	66000	320100	622500	1182800
	2	9600	63240	304600	581300	1097180
	3	9600	63800	311800	604200	1133400
32	1	9200	60800	293500	574000	1071800
	2	9200	58100	270400	530400	986260
	3	9200	61200	282400	551400	1018800
56	1	9000	56800	277500	520000	962150
	2	9000	53880	271000	505200	928400
	3	9000	49000	245100	445200	806600
100	1	8800	DEAD			
	2	8800	DEAD			
	3	8800	DEAD			

Table A7-2. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - MEAN CELL DENSITY (CELLS/ML)[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	3.14
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	8.33
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	23.21
Alpha value:	0.05
Critical value:	3.48
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A7-3
Alpha value:	0.05
Critical Value:	2.47
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all cells died during the test.

Table A7-3. GREEN ALGAE CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1205700		
10	3	1195633	0.264	
18	3	1137793	1.782	
32	3	1025647	4.725	*
56	3	899050	8.048	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.47).

APPENDIX 8

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK
BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B)
(TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	January 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	Selenastrum capricornutum
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
pH Buffer:	10 N NaOH

Endpoint:	Reduction in growth relative to control
Temperature:	25 ± 0.2 °C

Results:

Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 32% buffered groundwater by volume (See Tables A8-1, A8-2, and A8-3). Growth was not affected by exposure to 10% or 18% buffered groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 18% buffered groundwater by volume.
LOEC = 32% buffered groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 78.4 buffered groundwater by volume (95% confidence limits = 50.13-111.11).

Table A8-1. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO. 3) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	8800	70200	328900	644800	1211100
	2	8800	67800	321600	631000	1199800
	3	8800	69400	325100	635200	1206200
10	1	9600	69100	327100	645200	1232200
	2	9600	65200	319200	624800	1186400
	3	9600	60000	315400	606000	1147800
18	1	9400	59000	302200	588300	1094700
	2	9400	62000	315300	609900	1165900
	3	9400	60100	310000	596400	1120100
32	1	9200	61200	299100	581800	1083900
	2	9200	56100	281400	527600	974200
	3	9200	57400	290600	548800	1004350
56	1	9000	52100	208000	387900	672780
	2	9000	54000	247400	470800	881370
	3	9000	50800	215500	419700	731860
100	1	8800	44200	191700	349800	579940
	2	8800	40000	150400	231000	359300
	3	8800	41600	158600	286200	493100

Table A8-2. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - MEAN CELL DENSITY (CELLS/ML)

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.76
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variance:

Calculated test statistic:	10.33
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	49.55
Alpha value:	0.05
Critical value:	3.11
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A8-3
Alpha value:	0.05
Critical value:	2.50
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A8-3. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1205700		
10	3	1188800	0.292	
18	3	1126900	1.359	
32	3	1020817	3.189	*
56	3	762003	7.654	*
100	3	477447	12.563	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.50).

APPENDIX 9

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	March 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	*Selenastrum capricornutum*
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1×10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
Endpoint:	Reduction in growth relative to control

Temperature: 25 ± 0.2 °C

Results:

100% raw Canal Creek groundwater killed all algal cells during the first 24 h of exposure (Table A9-1). Significant (α = 0.05) reductions in growth (cell density) occurred at all concentrations down to 18% raw groundwater by volume (See Tables A9-1, A9-2, and A9-3). Growth was not affected by exposure to 10% raw groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 51.2% raw groundwater by volume (95% confidence limits = 47.66-55.26).

No difference in algal growth was detected between the UMD/WREC controls and the APG-EA diluent controls (t-test: critical value = 4.60; t statistic = -0.63; α = 0.01).

TABLE A9-1. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 4) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	11000	84600	350200	700200	1444000
	2	11000	79200	340100	685900	1380800
	3	11000	87000	353000	696400	1422200
APG-EA Diluent Water	1	12000	82800	348400	694800	1385900
	2	12000	80000	337600	680400	1422500
	3	12000	88200	355400	699800	1397800
10	1	10800	81800	341600	686200	1373200
	2	10800	86400	358100	702800	1458100
	3	10800	85200	352800	695500	1428200
18	1	12000	82300	336200	653200	1332200
	2	12000	77600	328100	640800	1275500
	3	12000	81000	333333	648700	1309500
32	1	10600	80100	327200	637400	1259800
	2	10600	77800	323400	630300	1225800
	3	10600	75200	320800	626200	1204600
56	1	10000	73400	278200	540200	842300
	2	10000	77100	295200	555000	924400
	3	10000	75500	281800	547400	880500
100	1	12000	DEAD			
	2	12000	DEAD			
	3	12000	DEAD			

Table A9-2. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - MEAN CELL DENSITY (CELLS/ML)[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.14
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	0.56
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	118.61
Alpha value:	0.05
Critical value:	3.48
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A9-3
Alpha value:	0.05
Critical Value:	2.47
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all cells died during the test.

Table A9-3. GREEN ALGAE CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1415666		
10	3	1419833	-0.145	
18	3	1305733	3.835	*
32	3	1230066	6.475	*
56	3	882400	18.603	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.47).

APPENDIX 10

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	March 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	*Selenastrum capricornutum*
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
pH Buffer:	10 N NaOH

Endpoint:	Reduction in growth relative to control
Temperature:	25 ± 0.2 °C

Results:

Significant ($\alpha = 0.05$) reductions in growth (cell density) occurred at all concentrations down to 32% buffered groundwater by volume (See Tables A10-1, A10-2, and A10-3). Growth was not affected by exposure to 10% or 18% buffered groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 18% buffered groundwater by volume.
LOEC = 32% buffered groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 67.2 buffered groundwater by volume (95% confidence limits = 59.41-78.79).

Table A10-1. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO. 4) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	11000	84600	350200	700200	1444000
	2	11000	79800	340100	685900	1380800
	3	11000	87000	353000	696400	1422200
10	1	10800	82200	342400	697200	1431200
	2	10800	88100	358100	704500	1442500
	3	10800	84100	347400	693100	1426900
18	1	12000	85200	340400	681200	1383800
	2	12000	82200	346100	688200	1378800
	3	12000	79100	336400	676400	1350500
32	1	11000	79200	322400	622200	1210400
	2	11000	77800	316100	616800	1162300
	3	11000	73100	312000	609800	1097100
56	1	10500	73800	250100	464900	833800
	2	10500	75800	280100	478200	874900
	3	10500	71600	260800	459400	797000
100	1	11500	60100	165400	266100	390700
	2	11500	70800	180200	285800	513900
	3	11500	62600	171400	277600	454400

Table A10-2. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - MEAN CELL DENSITY (CELLS/ML)

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.76
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variance:

Calculated test statistic:	6.62
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	280.14
Alpha value:	0.05
Critical value:	3.11
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A10-3
Alpha value:	0.05
Critical value:	2.50
Conclusion:	Reject the null hypothesis that all groups are equal

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TABLE A10-3. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1415666		
10	3	1433533	-0.537	
18	3	1371033	1.341	
32	3	1156600	7.785	*
56	3	835233	17.442	*
100	3	453000	28.929	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.50).

APPENDIX 11

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	May 3-7, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	_Selenastrum capricornutum_
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
Endpoint:	Reduction in growth relative to control

Temperature: 25 ± 0.2 °C

Results:

100% raw Canal Creek groundwater killed all algal cells during the first 24 h of exposure (Table A11-1). Significant ($\alpha = 0.05$) reductions in growth (cell density) occurred at all concentrations down to 32% raw groundwater by volume (See Tables A11-1, A11-2, and A11-3). Growth was not affected by exposure to 18% raw groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 47.6% raw groundwater by volume (95% confidence limits = 44.55-50.97).

No difference in algal growth was detected between the UMD/WREC controls and the APG-EA diluent controls (t-test: critical value = 4.60; t statistic = -2.37; $\alpha = 0.01$).

TABLE A11-1. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 5) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	9800	64000	310200	580400	1215800
	2	9800	60200	301200	577200	1210000
	3	9800	67800	316000	596400	1246400
APG-EA Diluent Water	1	9600	63800	304400	573600	1163200
	2	9600	59600	306600	577800	1190100
	3	9600	66200	308400	587200	1203100
10	1	10000	65200	314400	571400	1197300
	2	10000	67800	320200	568200	1183400
	3	10000	62400	308900	586200	1228100
18	1	8800	65000	304600	563200	1173900
	2	8800	62400	309800	577100	1188600
	3	8800	58700	298200	559100	1165300
32	1	9000	56400	277800	521400	1073100
	2	9000	60200	287000	517200	999900
	3	9000	62600	293800	533100	1090400
56	1	9600	50800	222100	340600	559300
	2	9600	48400	207600	336800	488300
	3	9600	53600	230100	351600	628400
100	1	9400	DEAD			
	2	9400	DEAD			
	3	9400	DEAD			

Table A11-2. GREEN ALGA CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - MEAN CELL DENSITY (CELLS/ML)[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.14
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	6.11
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	141.07
Alpha value:	0.05
Critical value:	3.48
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A11-3
Alpha value:	0.05
Critical Value:	2.47
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all cells died during the test.

Table A11-3. GREEN ALGAE CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1224067		
10	3	1202933	0.637	
18	3	1175933	1.450	
32	3	1054467	5.111	*
56	3	558667	20.051	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.47).

APPENDIX 12

GREEN ALGAL 96-H GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static
Date:	May 3-7, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	Double strength "AAP" medium (Miller et al., 1978) with P added to achieve a 20:1 N:P atomic ratio
Test Organism:	
Scientific Name:	*Selenastrum capricornutum*
Age at Start of Test:	Log growth
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	250 mL glass culture flasks with cheesecloth/cotton stoppers
Test Solution Volume:	100 mL
Initial Cell Density:	≈1 x 10^4 cells/mL
No. Replicates per Treatment:	3
Lighting:	Fluorescent; cool white; continuous; ≈300 foot candles
Shaking Rate:	100 cpm continuously
pH Buffer:	10 N NaOH

Endpoint:	Reduction in growth relative to control
Temperature:	25 ± 0.2 °C

Results:

Significant ($\alpha = 0.05$) reductions in growth (cell density) occurred at all concentrations down to 32% buffered groundwater by volume (See Tables A12-1, A12-2, and A12-3). Growth was not affected by exposure to 10% or 18% buffered groundwater by volume. The NOEC and LOEC for reduction in growth are as follows:

NOEC = 18% buffered groundwater by volume.
LOEC = 32% buffered groundwater by volume.

The 96-h EC50 (reduction in growth), which was determined by the moving average angle method, is as follows:

96-h EC50 = 95.9 buffered groundwater by volume (95% confidence limits = 81.51-124.57).

Table A12-1. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO. 5) - MEAN CELL DENSITY (CELLS/ML) AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Mean Cell Density				
		0H	24H	48H	72H	96H
Growth Medium	1	9800	64000	310200	580400	1215800
	2	9800	60200	301200	577200	1210000
	3	9800	67800	316000	596400	1246400
10	1	10100	62800	304400	573600	1163200
	2	10100	59600	306600	577800	1190100
	3	10100	64200	312400	585600	1203100
18	1	9400	64800	309600	583400	1190800
	2	9400	59000	303200	576400	1157500
	3	9400	61800	304400	581200	1172600
32	1	9800	59700	286800	574400	1088100
	2	9800	60400	297600	577400	1124100
	3	9800	61600	300900	580000	1142300
56	1	10000	59600	280400	517400	963300
	2	10000	55400	277100	506800	902000
	3	10000	60000	285100	526500	1013200
100	1	9800	52400	235400	365800	670700
	2	9800	51000	219800	348600	607100
	3	9800	49700	210400	330400	479800

Table A12-2. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - MEAN CELL DENSITY (CELLS/ML)

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	3.76
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variance:

Calculated test statistic:	8.82
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	72.99
Alpha value:	0.05
Critical value:	3.11
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A12-3
Alpha value:	0.05
Critical value:	2.50
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A12-3. GREEN ALGA CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON MEAN CELL DENSITY (CELLS/ML)

Conc (% by Vol)	No. of Reps	Mean Cell Density	T Statistic	Significance
Growth Medium	3	1224067		
10	3	1185467	0.965	
18	3	1173633	1.261	
32	3	1118167	2.649	*
56	3	959500	6.617	*
100	3	585867	15.963	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.50).

APPENDIX 13

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	September 13-20, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A13-1
Test Organism:	
Scientific Name:	<u>Ceriodaphnia</u> <u>dubia</u>
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
Endpoints:	Mortality of adults; number of

neonates produced in 3 broods

Water Quality: Table A13-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 48-h exposure (Table A13-2). The organisms in all other treatments lived. The 48-h LC50, which was determined by the moving average angle method, is as follows:

48-h LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure (Table A13-3); organisms in all other treatments lived. The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

Cladoceran survival was not affected by exposure to APG-EA diluent water.

Neonate Production:

Raw groundwater significantly (α = 0.05) reduced neonate production relative to the controls down to 18% raw groundwater by volume (see Tables A13-3, A13-4, and A13-5). The NOEC and LOEC for the cladocerans, based on reduced neonate production, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Neonate production was not affected by exposure to APG-EA diluent water relative to the UMD\WREC controls (t-test: critical value = 2.88; t statistic = -1.17; α = 0.01)..

TABLE A13-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.4	8.3	8.2	8.1	8.2	7.9	7.9
Day 1							
0 H	8.1	8.2	8.2	8.3	8.2	8.2	8.3
24 H	8.0	8.0	8.1	8.0	8.1	8.0	
Day 2							
0 H	7.8	8.3	8.2	8.3	8.1	8.4	8.0
24 H	8.1	8.4	8.3	8.5	8.3	8.0	
Day 3							
0 H	7.9	8.4	8.1	8.2	8.2	8.1	8.1
24 H	8.0	8.3	8.1	8.4	8.2	8.1	
Day 4							
0 H	8.1	8.5	8.2	8.3	8.4	8.3	8.1
24 H	8.1	8.3	8.2	8.1	8.1	8.2	
Day 5							
0 H	8.2	8.4	8.1	8.1	8.3	8.2	8.2
24 H	8.2	8.4	8.1	8.2	8.2	8.1	
Day 6							
0 H	8.1	8.3	8.2	8.2	8.2	8.1	8.1
24 H	8.3	8.4	8.2	8.2	8.0	8.0	
Day 7							
24 H	8.2	8.3	8.1	8.0	8.1	8.0	

TABLE A13-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	6.91	7.14	7.04	6.96	6.74	6.10	3.96
Day 1							
0 H	7.00	7.22	7.16	7.02	6.88	6.30	3.98
24 H	6.96	7.86	7.89	8.06	8.00	7.91	
Day 2							
0 H	6.95	7.05	7.03	6.98	6.93	6.41	3.95
24 H	7.10	7.37	7.50	7.72	7.64	7.57	
Day 3							
0 H	7.01	7.14	7.10	6.88	6.81	6.27	3.99
24 H	7.02	7.49	7.46	7.77	7.68	7.49	
Day 4							
0 H	7.39	7.79	7.73	7.60	7.38	6.69	3.96
24 H	7.14	7.69	7.98	8.06	8.07	7.91	
Day 5							
0 H	7.29	7.65	7.58	7.39	7.09	6.38	3.95
24 H	7.21	7.59	7.79	7.89	7.90	7.56	
Day 6							
0 H	7.19	7.40	7.33	7.30	7.01	6.79	3.99
24 H	7.25	7.60	7.69	7.77	7.81	7.38	
Day 7							
24 H	7.25	7.51	7.60	7.81	7.85	7.46	

TABLE A13-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	290	160	410
Day 1			
0 H	260	170	400
Day 2			
0 H	200	175	410
Day 3			
0 H	210	170	400
Day 4			
0 H	200	160	410
Day 5			
0 H	200	160	420
Day 6			
0 H	200	160	400
Day 7			
24 H	210	160	

TABLE A13-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	50	45	[a]
Day 1			
0 H	55	50	
Day 2			
0 H	50	50	
Day 3			
0 H	50	40	
Day 4			
0 H	55	50	
Day 5			
0 H	50	40	
Day 6			
0 H	55	40	
Day 7			
24 H	50	50	

[a] Could not obtain measurement.

TABLE A13-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	68	68	[a]
Day 1			
0 H	72	72	
Day 2			
0 H	68	64	
Day 3			
0 H	72	68	
Day 4			
0 H	72	72	
Day 5			
0 H	64	68	
Day 6			
0 H	68	64	
Day 7			
24 H	70	64	

[a] Could not obtain measurement.

TABLE A13-2. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
APG-EA Diluent	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	0	0

TABLE A13-3. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 1) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	5	12	14	31
	2	5	12	16	33
	3	4	13	16	33
	4	4	10	17	31
	5	5	8	15	28
	6	7	13	21	41
	7	7	10	16	33
	8	3	9	16	28
	9	9	9	14	32
	10	5	10	16	31
APG-EA Diluent Water	1	4	10	17	31
	2	5	10	19	34
	3	4	7	16	27
	4	4	10	17	31
	5	4	8	18	30
	6	3	9	19	31
	7	6	9	20	35
	8	8	6	17	31
	9	3	9	15	27
	10	4	9	14	27
10	1	4	8	18	30
	2	5	11	16	32
	3	5	13	9	27
	4	5	10	14	29
	5	4	10	14	28
	6	4	7	20	31
	7	5	10	16	31
	8	4	9	15	28
	9	3	8	18	29
	10	4	8	20	32

TABLE A13-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
18	1	2	9	11	22
	2	3	7	19	29
	3	6	5	14	25
	4	0	5	14	19
	5	3	8	11	22
	6	7	3	14	24
	7	3	7	11	21
	8	3	9	14	26
	9	6	12	12	30
	10	9	11	13	33
32	1	5	8	10	23
	2	5	10	13	28
	3	4	9	9	22
	4	5	9	10	24
	5	3	6	0	9
	6	5	9	0	14
	7	4	8	10	22
	8	6	9	9	24
	9	3	8	8	19
	10	6	7	0	13
56	1	4	6	8	18
	2	0	6	8	14
	3	3	9	6	18
	4	0	4	3	7
	5	0	5	1	6
	6	5	0	0	5
	7	3	2	4	9
	8	6	5	0	11
	9	7	5	3	15
	10	6	1	7	14
100	1	DEAD			
	2	DEAD			
	3	DEAD			
	4	DEAD			
	5	DEAD			
	6	DEAD			
	7	DEAD			
	8	DEAD			
	9	DEAD			
	10	DEAD			

TABLE A13-4. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	1.45
Alpha value:	0.01
Critical value:	13.28
Conclusion	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	11.15
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	35.37
Alpha value:	0.05
Critical value:	2.61
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistics:	See Table A13-5
Alpha value:	0.05
Critical value:	2.23
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A13-5. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON MEAN NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean No. Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	32.1		
10	10	29.7	1.23	
18	10	25.1	3.60	*
32	10	19.8	6.32	*
56	10	11.7	10.79	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.23).

APPENDIX 14

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	September 13-20, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A14-1
Test Organism:	
Scientific Name:	Ceriodaphnia dubia
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
pH Buffer:	10 N NaOH

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A14-1

Results:

<u>Mortality</u>:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival. The data are summarized in Table A14-2.

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred to the cladocerans exposed to 100% buffered groundwater by volume; statistically significant mortality did not occur at 32 and 56% buffered groundwater by volume (see Tables A14-3, A14-4, and A14-5). The 7-d LC50 for adult mortality, which was determined by the moving average angle method, is as follows:

7-d LC50 = 56.3% buffered groundwater by volume (95% confidence limits = 47.11-67.40).

<u>Neonate Production</u>:

A significant ($\alpha = 0.01$) reduction in neonate production relative to the controls occurred at concentrations down to 18% buffered groundwater by volume. Neonate production was not affected by exposure to 10% buffered groundwater by volume (see Tables A14-3 and A14-6). The NOEC and LOEC for exposure of the organism to buffered Canal Creek groundwater, are as follows:

NOEC: 10% buffered groundwater by volume
LOEC: 18% buffered groundwater by volume

Table A14-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.3	8.1	8.1	7.9	8.0	7.7
Day 1						
0 H	8.2	8.0	7.8	7.9	8.0	8.0
24 H	8.0	8.0	7.9	8.1	8.0	7.9
Day 2						
0 H	8.3	8.2	8.1	8.3	8.0	8.0
24 H	8.4	8.4	8.5	8.6	8.3	8.2
Day 3						
0 H	8.3	8.3	8.2	8.3	8.2	8.1
24 H	8.4	8.4	8.4	8.5	8.2	7.6
Day 4						
0 H	8.5	8.2	8.3	8.5	8.3	7.7
24 H	8.3	8.3	8.3	8.5	8.3	7.7
Day 5						
0 H	8.4	8.1	8.2	8.2	8.0	8.1
24 H	8.4	8.3	8.2	8.3	8.2	7.9
Day 6						
0 H	8.4	8.2	8.3	8.2	8.2	8.1
24 H	8.4	8.3	8.1	8.2	8.1	8.3
Day 7						
24 H	8.3	8.2	8.1	8.2	8.0	8.2

TABLE A14-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.14	7.18	7.15	7.14	7.06	7.02
Day 1						
0 H	7.22	7.12	7.19	7.25	7.30	6.25
24 H	7.86	7.96	8.22	8.16	8.34	8.30
Day 2						
0 H	7.05	7.11	7.21	7.24	7.28	7.29
24 H	7.37	7.90	8.13	8.16	8.16	8.05
Day 3						
0 H	7.14	7.15	7.26	7.29	7.31	7.38
24 H	7.49	7.88	8.14	8.02	7.48	7.41
Day 4						
0 H	7.29	7.57	7.74	7.78	7.71	7.59
24 H	7.69	7.99	8.08	8.20	8.23	8.35
Day 5						
0 H	7.65	7.31	7.29	7.19	7.18	7.09
24 H	7.59	7.78	8.07	7.96	8.02	8.14
Day 6						
0 H	7.40	7.27	7.25	7.23	7.19	7.18
24 H	7.60	7.25	7.30	7.46	7.65	8.00
Day 7						
24 H	7.51	7.60	7.59	7.76	7.70	8.09

TABLE A14-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	160	510
Day 1		
0 H	170	500
Day 2		
0 H	175	490
Day 3		
0 H	170	510
Day 4		
0 H	160	500
Day 5		
0 H	160	510
Day 6		
0 H	160	500
Day 7		
24 H	160	500

TABLE A14-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	45	60
Day 1		
0 H	50	54
Day 2		
0 H	50	60
Day 3		
0 H	40	64
Day 4		
0 H	50	60
Day 5		
0 H	40	60
Day 6		
0 H	40	54
Day 7		
24 H	50	65

TABLE A14-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	[a]
Day 1		
0 H	72	
Day 2		
0 H	64	
Day 3		
0 H	68	
Day 4		
0 H	72	
Day 5		
0 H	68	
Day 6		
0 H	64	
Day 7		
24 H	64	

[a] Could not obtain measurement.

TABLE A14-2 CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	9	90

TABLE A14-3. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO.1) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PRODUCED PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	5	12	14	31
	2	5	12	16	33
	3	4	13	16	33
	4	4	10	17	31
	5	5	8	15	28
	6	7	13	21	41
	7	7	10	16	33
	8	3	9	16	28
	9	9	9	14	32
	10	5	10	16	31
10	1	6	10	14	30
	2	5	10	17	32
	3	a			
	4	4	8	17	29
	5	6	10	15	31
	6	4	10	16	30
	7	6	7	14	27
	8	7	6	18	31
	9	5	9	13	27
	10	8	10	13	31
18	1	4	12	14	30
	2	4	9	11	24
	3	3	10	11	24
	4	4	5	19	28
	5	6	9	7	22
	6	4	9	15	28
	7	4	5	11	20
	8	6	9	12	27
	9	5	6	16	27
	10	4	6	14	24

TABLE A14-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
32	1	3	3	0	6
	2	0	0	0	0
	3	0	0	0	0
	4	6	4	DEAD	10
	5	4	8	DEAD	12
	6	5	10	8	23
	7	5	0	0	5
	8	3	0	0	3
	9	7	8	0	15
	10	0	9	0	9
56	1	4	3	DEAD	7
	2	5	1	0	6
	3	4	0	0	4
	4	6	0	0	6
	5	0	2	0	2
	6	6	2	0	8
	7	6	5	0	11
	8	4	0	DEAD	4
	9	0	0	0	0
	10	0	4	0	4
100	1	4	DEAD		4
	2	6	DEAD		6
	3	6	DEAD		6
	4	6	DEAD		6
	5	5	DEAD		5
	6	6	DEAD		6
	7	DEAD			
	8	4	DEAD		4
	9	6	DEAD		6
	10	5	DEAD		5

[a] Male adult, which was included in survival analysis, was not included in the neonate production analysis.

TABLE A14-4. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A14-5
Alpha value:	0.05
Critical value:	6
Conclusion:	Reject the null hypothesis that all groups are equal.

TABLE A14-5. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF FISHER'S EXACT TEST ON ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	10	0		
10	10	0	10	
18	10	0	10	
32	8	2	8	
56	8	2	8	
100	0	10	0	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 6).

TABLE A14-6. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	2.86
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	19.83
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Reject the null hypothesis that the variances are homogenous

Wilcoxon Rank Sum Test with Bonferroni Adjustment:

Calculated rank sum:	See Table A14-7
Alpha value:	0.05
Critical value:	See Table A14-7
Conclusion:	Reject the null hypothesis that the variances are homogenous

[a] The 100% buffered Canal Creed groundwater treatment was not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for reproductive effects.

Table A14-7. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO.1) - RESULTS OF WILCOXON RANK SUM TEST ON NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Neonates Produced	Rank Sum	Critical Value	Significance
UMD/WREC Control	10	32.1			
10	9	29.8	67.0	62.0	
18	10	25.4	59.0	75.0	*
32	10	8.3	55.0	75.0	*
56	10	5.2	55.0	75.0	*

* Significantly different at alpha = 0.05.

APPENDIX 15

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	November 8-15, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A15-1
Test Organism:	
Scientific Name:	<u>Ceriodaphnia</u> <u>dubia</u>
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
Endpoints:	Mortality of adults; number of

	neonates produced in 3 broods
Water Quality:	Table A15-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 48-h exposure (Table A15-2). The organisms in all other treatments lived. The 48-h LC50, which was determined by the moving average angle method, is as follows:

48-h LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure (Table A15-3); organisms in all other treatments lived. The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

Survival was not affected by exposure to APG-EA diluent water.

Neonate Production:

Raw groundwater significantly ($\alpha = 0.05$) reduced neonate production relative to the controls down to 18% raw groundwater by volume (see Tables A15-3, A15-4, and A15-5). The NOEC and LOEC for the cladocerans, based on reduced neonate production, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Neonate production was not affected by exposure to APG-EA diluent water (t-test: critical value = 2.88; t statistic = -1.20; $\alpha = 0.01$).

TABLE A15-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.1	8.6	8.2	8.1	8.0	8.1	7.5
Day 1							
0 H	8.2	8.6	8.2	8.3	8.4	8.0	7.0
24 H	8.4	8.7	8.4	8.6	8.5	8.2	7.3
Day 2							
0 H	8.1	8.5	8.1	8.2	8.2	8.0	7.1
24 H	8.6	9.1	8.8	9.0	8.7	8.5	
Day 3							
0 H	8.0	8.5	8.1	8.3	8.1	8.1	7.1
24 H	8.5	8.8	8.7	8.8	8.5	8.3	
Day 4							
0 H	8.1	8.5	8.0	8.1	8.1	8.0	7.0
24 H	8.4	8.6	8.5	8.6	8.4	8.2	
Day 5							
0 H	8.0	8.4	8.1	8.1	8.0	8.1	7.1
24 H	8.3	8.5	8.4	8.4	8.3	8.2	
Day 6							
0 H	8.0	8.3	8.1	8.0	8.0	8.0	7.0
24 H	8.2	8.4	8.3	8.3	8.2	8.1	
Day 7							
24 H	8.2	8.2	8.0	8.2	8.1	8.1	

TABLE A15-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.15	7.73	7.17	6.94	6.69	6.30	3.80
Day 1							
0 H	7.11	7.57	7.28	6.91	6.61	6.21	3.69
24 H	8.00	7.50	7.91	7.96	7.64	7.42	5.30
Day 2							
0 H	7.18	8.04	7.76	7.62	7.18	6.84	3.75
24 H	7.88	8.33	8.47	8.68	8.10	7.89	
Day 3							
0 H	7.19	7.77	7.70	7.54	7.11	6.51	3.69
24 H	7.80	8.15	8.30	8.28	7.90	7.51	
Day 4							
0 H	7.20	7.70	7.15	6.99	6.79	6.34	3.46
24 H	7.90	7.95	7.95	7.99	7.80	7.33	
Day 5							
0 H	7.15	7.75	7.20	7.00	6.55	6.23	3.53
24 H	7.75	7.58	7.64	7.63	7.48	7.37	
Day 6							
0 H	7.19	7.70	7.22	6.95	6.60	6.17	3.36
24 H	7.83	7.83	7.76	7.65	7.46	7.30	
Day 7							
24 H	7.97	7.65	7.60	7.48	7.58	7.75	

TABLE A15-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	200	290	450
Day 1			
0 H	190	280	440
Day 2			
0 H	190	280	450
Day 3			
0 H	190	280	450
Day 4			
0 H	200	290	450
Day 5			
0 H	200	280	450
Day 6			
0 H	200	280	450
Day 7			
24 H	200	275	

TABLE A15-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	25	60	[a]
Day 1			
0 H	30	55	
Day 2			
0 H	30	50	
Day 3			
0 H	30	50	
Day 4			
0 H	30	60	
Day 5			
0 H	25	55	
Day 6			
0 H	30	50	
Day 7			
24 H	30	55	

[a] Could not obtain measurement.

TABLE A15-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	52	100	120
Day 1			
0 H	50	96	124
Day 2			
0 H	52	96	128
Day 3			
0 H	50	100	124
Day 4			
0 H	50	96	120
Day 5			
0 H	50	100	120
Day 6			
0 H	52	96	128
Day 7			
24 H	52	96	

TABLE A15-2. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
APG-EA Diluent	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	0	0

TABLE A15-3. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 2) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	3	11	14	28
	2	3	10	12	25
	3	3	9	17	29
	4	5	12	12	29
	5	3	10	14	27
	6	6	9	11	26
	7	6	10	16	32
	8	6	10	16	32
	9	6	8	17	31
	10	5	9	15	29
APG-EA Diluent Water	1	4	10	13	27
	2	4	11	14	29
	3	5	12	12	29
	4	4	8	14	26
	5	5	10	13	28
	6	4	9	13	26
	7	5	14	12	31
	8	5	10	13	28
	9	4	8	14	26
	10	3	11	13	27
10	1	5	8	12	25
	2	5	9	12	26
	3	6	8	13	27
	4	5	9	13	27
	5	4	9	14	27
	6	4	9	12	25
	7	4	13	13	30
	8	6	10	15	31
	9	5	9	14	28
	10	4	12	14	30

TABLE A15-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
18	1	2	4	8	14
	2	2	6	9	17
	3	5	5	10	20
	4	4	9	14	27
	5	6	5	9	20
	6	4	4	8	16
	7	4	7	11	22
	8	5	10	10	25
	9	5	13	9	27
	10	2	4	15	21
32	1	4	8	11	23
	2	6	6	9	21
	3	4	7	7	18
	4	4	1	11	16
	5	4	1	10	15
	6	4	7	11	22
	7	4	7	12	23
	8	1	7	7	15
	9	5	5	7	17
	10	3	6	7	16
56	1	4	0	0	4
	2	3	0	0	3
	3	2	0	0	2
	4	4	0	0	4
	5	4	0	0	4
	6	4	0	0	4
	7	5	0	2	7
	8	3	0	0	3
	9	4	0	0	4
	10	3	0	1	4
100	1	DEAD			
	2	DEAD			
	3	DEAD			
	4	DEAD			
	5	DEAD			
	6	DEAD			
	7	DEAD			
	8	DEAD			
	9	DEAD			
	10	DEAD			

TABLE A15-4. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	1.43
Alpha value:	0.01
Critical value:	13.28
Conclusion	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	13.82
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Reject the null hypothesis that the variances are homogenous
Steel's Many-One Rank Test:	
Calculated test statistics:	See Table A15-5
Alpha value:	0.05
Critical value:	76.0
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A15-5. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF STEEL'S MANY-ONE RANK TEST ON MEAN NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean No. Neonates Produced	Rank Sum	Critical Value	Significance
UMD/WREC Control	10	28.8			
10	10	27.6	90.0	76.0	
18	10	20.9	60.5	76.0	*
32	10	18.6	55.0	76.0	*
56	10	3.9	55.0	76.0	*

* Significantly different at alpha = 0.05.

APPENDIX 16

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	November 8-15, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A6-1
Test Organism:	
Scientific Name:	Ceriodaphnia dubia
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
pH Buffer:	10 N NaOH

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A16-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. Buffered groundwater did not affect larval survival after 48 h of exposure. The data are summarized in Table A16-2.

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred to the cladocerans exposed to 56% and 100% buffered groundwater by volume (see Tables A16-3, A16-4, and A16-5). The 7-d LC50 for adult mortality, which was determined by the moving average angle method, is as follows:

7-d LC50 = 66.3% buffered groundwater by volume (95% confidence limits = 52.88-97.61).

Neonate Production:

A significant ($\alpha = 0.01$) reduction in neonate production relative to the controls occurred at concentrations down to 18% buffered groundwater by volume. Neonate production was not affected by exposure to 10% buffered groundwater by volume (see Tables A16-3 and A16-6). The NOEC and LOEC for exposure of the organism to buffered Canal Creek groundwater, are as follows:

NOEC: 10% buffered groundwater by volume
LOEC: 18% buffered groundwater by volume

Table A16-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.6	7.8	7.8	7.8	7.9	7.7
Day 1						
0 H	8.7	8.2	8.2	8.1	8.1	7.6
24 H	8.6	8.6	8.5	8.4	8.4	8.4
Day 2						
0 H	8.5	8.2	8.2	8.2	8.3	7.8
24 H	9.1	8.6	8.6	8.7	8.8	8.1
Day 3						
0 H	8.5	8.1	8.1	8.3	8.2	7.7
24 H	8.8	8.5	8.5	8.6	8.6	8.0
Day 4						
0 H	8.5	8.2	8.1	8.3	8.1	7.9
24 H	8.6	8.4	8.3	8.5	8.5	8.1
Day 5						
0 H	8.4	8.1	8.0	8.3	8.2	8.0
24 H	8.3	8.3	8.2	8.4	8.4	8.2
Day 6						
0 H	8.3	8.0	8.1	8.0	8.0	8.0
24 H	8.4	8.1	8.1	8.3	8.3	8.1
Day 7						
24 H	8.2	8.2	8.2	8.2	8.0	8.1

TABLE A16-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.73	7.54	7.52	7.46	7.41	7.38
Day 1						
0 H	7.57	7.63	7.67	7.72	7.76	7.79
24 H	7.50	8.36	8.39	8.40	8.24	8.24
Day 2						
0 H	8.04	7.90	7.80	7.70	7.63	7.38
24 H	8.33	8.44	8.64	8.78	8.92	8.78
Day 3						
0 H	7.77	7.67	7.71	7.71	7.52	7.46
24 H	8.15	8.35	8.29	8.38	8.47	8.35
Day 4						
0 H	7.70	7.60	7.56	7.50	7.40	7.41
24 H	7.95	8.30	8.35	8.40	8.45	8.30
Day 5						
0 H	7.75	7.52	7.37	7.26	7.21	7.14
24 H	7.58	7.73	7.66	7.84	8.00	7.99
Day 6						
0 H	7.70	7.23	7.22	7.20	7.12	7.08
24 H	7.83	7.80	7.83	7.93	8.03	7.96
Day 7						
24 H	7.65	7.93	7.69	8.05	8.13	7.91

TABLE A16-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	290	790
Day 1		
0 H	280	800
Day 2		
0 H	280	810
Day 3		
0 H	280	800
Day 4		
0 H	290	800
Day 5		
0 H	280	800
Day 6		
0 H	280	800
Day 7		
24 H	290	800

TABLE A16-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	60	85
Day 1		
0 H	55	80
Day 2		
0 H	50	85
Day 3		
0 H	50	80
Day 4		
0 H	60	80
Day 5		
0 H	55	80
Day 6		
0 H	50	85
Day 7		
24 H	50	85

TABLE A16-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	100	60
Day 1		
0 H	96	56
Day 2		
0 H	96	60
Day 3		
0 H	100	60
Day 4		
0 H	96	60
Day 5		
0 H	100	56
Day 6		
0 H	100	60
Day 7		
24 H	100	60

TABLE A16-2. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	10	100

TABLE A16-3. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO.2) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PRODUCED PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	3	11	14	28
	2	3	10	12	25
	3	3	9	17	29
	4	5	12	12	29
	5	3	10	14	27
	6	6	9	11	26
	7	6	10	16	32
	8	6	10	16	32
	9	6	8	17	31
	10	5	9	15	29
10	1	4	8	14	26
	2	5	6	13	24
	3	8	6	14	28
	4	5	5	17	27
	5	6	6	13	25
	6	6	6	19	31
	7	2	9	14	25
	8	4	6	17	27
	9	6	5	16	27
	10	4	14	18	36
18	1	0	0	4	4
	2	3	0	0	3
	3	4	0	3	7
	4	0	2	4	6
	5	0	0	3	3
	6	0	0	2	2
	7	0	2	6	8
	8	0	0	4	4
	9	6	0	5	11
	10	3	0	7	10

TABLE A16-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
32	1	0	0	2	2
	2	5	0	0	5
	3	6	0	0	6
	4	3	0	4	7
	5	3	0	2	5
	6	0	0	0	0
	7	4	0	0	4
	8	5	0	0	5
	9	3	0	0	3
	10	2	0	6	8
56	1	5	0	2	7
	2	6	DEAD		6
	3	5	0	0	5
	4	0	0	0	0
	5	4	DEAD		4
	6	5	0	DEAD	5
	7	3	0	DEAD	3
	8	5	0	0	5
	9	5	0	0	5
	10	3	0	0	3
100	1	3	DEAD		3
	2	4	DEAD		4
	3	0	0	0	0
	4	3	0	DEAD	3
	5	0	DEAD		0
	6	3	DEAD		3
	7	3	DEAD		3
	8	4	0	0	4
	9	0	DEAD		0
	10	3	DEAD		3

TABLE A16-4. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A16-5
Alpha value:	0.05
Critical value:	6
Conclusion:	Reject the null hypothesis that all groups are equal.

TABLE A16-5. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF FISHER'S EXACT TEST ON ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	10	0		
10	10	0	10	
18	10	0	10	
32	10	0	10	
56	6	4	6	*
100	2	8	2	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 6).

TABLE A16-6. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	0.95
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	2.04
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	211.66
Alpha value:	0.05
Critical value:	2.92
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A16-7
Alpha value:	0.05
Critical value:	2.15
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 56% and 100% buffered Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for reproductive effects.

Table A16-7. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO.2) - RESULTS OF DUNNETT'S TEST ON NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	28.8		
10	10	27.6	0.926	
18	10	5.8	17.754	*
32	10	4.5	18.757	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.15).

APPENDIX 17

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	January 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A17-1
Test Organism:	
Scientific Name:	*Ceriodaphnia dubia*
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
Endpoints:	Mortality of adults; number of

	neonates produced in 3 broods
Water Quality:	Table A17-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 48-h exposure (Table A17-2). The organisms in all other treatments lived. The 48-h LC50, which was determined by the moving average angle method, is as follows:

48-h LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure; one organism died in the 56% raw groundwater treatment (Table A17-2). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 62.8% raw groundwater by volume (95% confidence limits = 54.99-73.69).

Survival was not affected by exposure to APG-EA diluent water.

Neonate Production:

Raw groundwater significantly ($\alpha = 0.05$) reduced neonate production relative to the controls down to 32% raw groundwater by volume (see Tables A17-3, A17-4, and A17-5). The NOEC and LOEC for the cladocerans, based on reduced neonate production, are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

Neonate production was not affected by exposure to West Branch creek water or APG-EA diluent water relative to the UMD/WREC controls (t-test: critical value = 2.88; t statistic = -0.11; $\alpha = 0.01$).

TABLE A17-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.1	8.1	8.2	7.8	7.8	7.6	6.7
Day 1							
0 H	8.2	8.4	8.3	8.2	8.2	7.6	7.0
24 H	8.9	8.9	8.8	8.9	8.8	8.8	8.1
Day 2							
0 H	8.3	8.8	8.7	8.7	8.5	7.8	7.1
24 H	8.6	8.8	8.9	8.9	8.8	8.3	
Day 3							
0 H	8.5	8.6	8.5	8.5	8.3	8.1	7.1
24 H	8.5	8.7	8.8	8.7	8.7	8.2	
Day 4							
0 H	8.6	8.6	8.4	8.3	8.2	8.2	7.2
24 H	8.4	8.7	8.6	8.6	8.6	8.1	
Day 5							
0 H	8.5	8.5	8.4	8.3	8.2	8.1	7.1
24 H	8.3	8.6	8.5	8.4	8.5	8.2	
Day 6							
0 H	8.5	8.5	8.3	8.3	8.5	8.1	7.0
24 H	8.4	8.7	8.3	8.2	8.3	8.2	
Day 7							
24 H	8.3	8.6	7.9	8.0	8.1	8.1	

TABLE A17-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.66	7.21	6.69	6.32	6.01	5.41	3.67
Day 1							
0 H	7.62	7.54	7.11	6.67	6.27	5.67	3.74
24 H	7.99	8.12	8.00	7.90	7.79	7.56	4.79
Day 2							
0 H	7.59	7.21	6.89	6.66	6.26	5.23	3.79
24 H	7.59	7.51	7.81	7.89	7.85	7.62	
Day 3							
0 H	7.51	7.37	7.12	6.80	6.35	5.47	3.71
24 H	7.55	7.43	7.41	7.52	7.44	7.38	
Day 4							
0 H	7.50	7.20	6.86	6.81	6.64	5.99	3.79
24 H	7.59	7.93	7.87	7.69	7.65	7.70	
Day 5							
0 H	7.48	7.63	7.54	7.23	6.88	6.23	3.84
24 H	7.65	8.04	8.11	8.15	7.91	7.80	
Day 6							
0 H	7.50	7.49	7.23	7.02	6.61	5.97	3.79
24 H	7.71	8.00	8.04	8.09	8.12	8.05	
Day 7							
24 H	7.62	7.86	7.95	8.13	8.18	8.15	

TABLE A17-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	250	110	410
Day 1			
0 H	250	110	400
Day 2			
0 H	250	100	400
Day 3			
0 H	250	110	410
Day 4			
0 H	240	110	400
Day 5			
0 H	250	110	410
Day 6			
0 H	240	100	420
Day 7			
24 H	240	110	

TABLE A17-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	30	[a]
Day 1			
0 H	65	35	
Day 2			
0 H	60	30	
Day 3			
0 H	60	35	
Day 4			
0 H	60	30	
Day 5			
0 H	60	35	
Day 6			
0 H	65	30	
Day 7			
24 H	60	35	

[a] Could not obtain measurement.

TABLE A17-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	52	44	110
Day 1			
0 H	56	40	100
Day 2			
0 H	56	44	100
Day 3			
0 H	56	44	110
Day 4			
0 H	56	40	100
Day 5			
0 H	56	44	110
Day 6			
0 H	52	40	110
Day 7			
24 H	52	44	

TABLE A17-2. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
APG-EA Diluent	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	0	0

TABLE A17-3. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 3) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	4	9	12	25
	2	4	11	12	27
	3	6	8	12	26
	4	5	8	13	26
	5	5	11	17	33
	6	4	11	12	27
	7	5	10	15	30
	8	5	12	13	30
	9	3	10	14	27
	10	4	8	16	28
APG-EA Diluent Water	1	4	9	15	28
	2	5	9	13	27
	3	5	9	17	31
	4	5	10	12	27
	5	5	11	11	27
	6	4	9	14	27
	7	4	10	13	27
	8	4	9	16	29
	9	5	11	12	28
	10	4	9	14	27
10	1	4	9	12	25
	2	5	8	14	27
	3	5	9	13	27
	4	6	8	14	28
	5	5	6	14	25
	6	5	10	13	28
	7	5	9	14	28
	8	4	9	13	26
	9	3	9	14	26
	10	5	9	15	29

TABLE A17-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
18	1	3	7	12	22
	2	4	9	13	26
	3	4	8	14	26
	4	5	7	14	26
	5	4	2	15	21
	6	5	8	13	26
	7	4	8	17	29
	8	3	5	14	22
	9	4	6	13	23
	10	3	13	12	28
32	1	4	4	7	15
	2	4	7	18	29
	3	3	8	12	23
	4	3	9	0	12
	5	5	7	5	17
	6	5	5	7	17
	7	4	8	8	20
	8	4	7	0	11
	9	3	8	12	23
	10	3	8	5	16
56	1	2	3	0	5
	2	3	0	0	3
	3	3	0	0	3
	4	3	1	0	4
	5	2	0	0	2
	6	4	5	0	9
	7	4	0	0	4
	8	2	0	0	2
	9	0	DEAD		0
	10	2	0	0	2
100	1	DEAD			
	2	DEAD			
	3	DEAD			
	4	DEAD			
	5	DEAD			
	6	DEAD			
	7	DEAD			
	8	DEAD			
	9	DEAD			
	10	DEAD			

TABLE A17-4. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	1.43
Alpha value:	0.01
Critical value:	13.28
Conclusion	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	17.86
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Reject the null hypothesis that the variances are homogenous
Wilcoxon Rank-Sum Test:	
Calculated test statistics:	See Table A17-5
Alpha value:	0.05
Critical value:	See Table A5-5
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A17-5. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF WILCOXON RANK SUM TEST ON MEAN NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean No. Neonates Produced	Rank Sum	Critical Value	Significance
UMD/WREC Control	10	27.9			
10	10	26.9	95.5	75.0	
18	10	24.9	76.5	75.0	
32	10	18.3	62.0	75.0	*
56	9	3.4	45.0	62.0	*

* Significantly different at alpha = 0.05.

APPENDIX 18

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	January 24-31, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A18-1
Test Organism:	
Scientific Name:	*Ceriodaphnia dubia*
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
pH Buffer:	10 N NaOH

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A18-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. Buffered groundwater did not affect adult survival after 48 h of exposure. The data are summarized in Table A18-2.

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred to the cladocerans at all concentrations down to 32% buffered groundwater by volume (see Tables A18-3, A18-4, and A18-5). The 7-d LC50 for adult mortality, which was determined by the moving average angle method, is as follows:

7-d LC50 = 37.8% buffered groundwater by volume (95% confidence limits = (27.83-49.02).

Neonate Production:

A significant ($\alpha = 0.01$) reduction in neonate production relative to the controls occurred at concentrations down to 18% buffered groundwater by volume. Neonate production was not affected by exposure to 10% buffered groundwater by volume (see Tables A18-3, A18-6, and A18-7). The NOEC and LOEC for exposure of the organism to buffered Canal Creek groundwater are as follows:

NOEC: 10% buffered groundwater by volume
LOEC: 18% buffered groundwater by volume

Table A18-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.1	7.7	8.0	8.1	8.0	7.0
Day 1						
0 H	8.4	8.5	8.4	8.2	7.9	7.5
24 H	8.9	8.5	8.8	8.9	9.0	9.0
Day 2						
0 H	8.8	8.5	8.4	8.2	7.9	8.0
24 H	8.8	8.5	8.3	8.5	8.7	8.9
Day 3						
0 H	8.5	8.1	8.3	8.1	7.9	7.7
24 H	8.7	8.4	8.2	8.3	8.5	8.8
Day 4						
0 H	8.6	8.4	8.2	8.2	8.0	7.8
24 H	8.7	7.3	8.1	8.2	8.5	8.7
Day 5						
0 H	8.5	8.4	8.3	8.3	8.1	7.9
24 H	8.6	7.5	7.6	7.7	8.1	8.5
Day 6						
0 H	8.5	8.4	8.6	8.5	8.3	8.1
24 H	8.7	8.5	8.3	8.1	8.5	8.6
Day 7						
24 H	8.6	7.8	8.0	8.1	8.3	8.4

TABLE A18-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.21	7.47	7.51	7.50	7.50	7.57
Day 1						
0 H	7.54	7.48	7.40	7.35	7.25	7.16
24 H	7.99	7.84	8.05	8.08	8.16	8.46
Day 2						
0 H	7.21	7.55	7.57	7.64	7.65	7.67
24 H	7.59	7.91	7.99	8.00	8.26	8.53
Day 3						
0 H	7.37	7.48	7.49	7.48	7.44	7.51
24 H	7.43	7.82	7.89	7.93	8.16	8.49
Day 4						
0 H	7.20	7.70	7.71	7.76	7.75	7.81
24 H	7.59	8.13	8.40	8.69	8.84	8.85
Day 5						
0 H	7.63	7.60	7.58	7.53	7.56	7.62
24 H	8.04	8.04	8.16	8.28	8.38	8.43
Day 6						
0 H	7.49	7.52	7.48	7.45	7.41	7.39
24 H	8.00	8.03	8.17	8.34	8.50	8.46
Day 7						
24 H	7.86	8.00	8.17	8.33	8.52	8.59

TABLE A18-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	110	500
Day 1		
0 H	110	500
Day 2		
0 H	100	490
Day 3		
0 H	110	500
Day 4		
0 H	110	490
Day 5		
0 H	110	500
Day 6		
0 H	100	500
Day 7		
24 H	100	500

TABLE A18-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	30	70
Day 1		
0 H	55	70
Day 2		
0 H	30	70
Day 3		
0 H	35	70
Day 4		
0 H	30	70
Day 5		
0 H	35	70
Day 6		
0 H	30	70
Day 7		
24 H	35	70

TABLE A18-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	44	70
Day 1		
0 H	40	72
Day 2		
0 H	44	70
Day 3		
0 H	44	72
Day 4		
0 H	40	70
Day 5		
0 H	44	72
Day 6		
0 H	40	72
Day 7		
24 H	40	72

TABLE A18-2. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	10	100

TABLE A18-3. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO.3) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PRODUCED PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	4	9	12	25
	2	4	11	12	27
	3	6	8	12	26
	4	5	8	13	26
	5	5	11	17	33
	6	4	11	12	27
	7	5	10	15	30
	8	5	12	13	30
	9	3	10	14	27
	10	4	8	16	28
10	1	6	7	10	23
	2	5	5	14	24
	3	5	4	15	24
	4	5	5	15	25
	5	4	7	15	26
	6	4	2	18	24
	7	6	10	15	31
	8	4	7	20	31
	9	4	9	13	26
	10	4	8	13	25
18	1	2	0	4	6
	2	6	0	7	13
	3	1	0	0	1
	4	0	0	0	0
	5	3	0	3	6
	6	3	0	0	3
	7	4	0	0	4
	8	0	0	5	5
	9	4	0	0	4
	10	2	0	0	2

TABLE A18-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
32	1	0	2	DEAD	2
	2	2	0	0	2
	3	2	DEAD		2
	4	0	0	DEAD	0
	5	0	0	DEAD	0
	6	3	0	0	3
	7	2	0	DEAD	2
	8	4	0	DEAD	4
	9	2	0	DEAD	2
	10	0	0	0	0
56	1	0	0	DEAD	0
	2	0	0	DEAD	0
	3	0	0	0	0
	4	0	DEAD		0
	5	0	0	DEAD	0
	6	0	0	0	0
	7	3	0	3	6
	8	3	0	DEAD	3
	9	5	0	DEAD	5
	10	0	0	0	0
100	1	0	0	DEAD	0
	2	0	0	DEAD	0
	3	0	0	DEAD	0
	4	0	0	DEAD	0
	5	0	DEAD		0
	6	2	DEAD		2
	7	1	0	DEAD	1
	8	2	DEAD		2
	9	0	0	DEAD	0
	10	0	0	0	0

TABLE A18-4. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A18-5
Alpha value:	0.05
Critical value:	6
Conclusion:	Reject the null hypothesis that all groups are equal.

TABLE A18-5. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF FISHER'S EXACT TEST ON ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	10	0		
10	10	0	10	
18	10	0	10	
32	3	7	3	*
56	4	6	4	*
100	1	9	1	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 6).

TABLE A18-6. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	9.38
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	1.43
Alpha value:	0.01
Critical value:	9.21
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	187.68
Alpha value:	0.05
Critical value:	3.35
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A18-7
Alpha value:	0.05
Critical value:	2.01
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 32%, 56% and 100% buffered Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for reproductive effects.

Table A18-7. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO.3) - RESULTS OF DUNNETT'S TEST ON NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	27.9		
10	10	25.9	1.487	
18	10	4.4	17.473	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.01).

APPENDIX 19

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A19-1
Test Organism:	
Scientific Name:	Ceriodaphnia dubia
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A19-1

Results:

<u>Mortality</u>:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 48-h exposure (Table A19-2). The organisms in all other treatments lived. The 48-h LC50, which was determined by the moving average angle method, is as follows:

48-h LC50 = 64.7% raw groundwater by volume (95% confidence limits = 57.17-75.48).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure; two organisms died in the 56% raw groundwater treatment and one organism died in the 32% raw groundwater treatment (Table A19-2). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 58.6% raw groundwater by volume (95% confidence limits = 50.00-69.65).

Survival was not affected by exposure to APG-EA diluent water.

<u>Neonate Production</u>:

Raw groundwater significantly (α = 0.05) reduced neonate production relative to the controls down to 18% raw groundwater by volume (see Tables A19-3, A19-4, and A19-5). The NOEC and LOEC for the cladocerans, based on reduced neonate production, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Neonate production was not affected by exposure to APG-EA diluent water relative to the UMD/WREC controls (t-test: critical value = 2.88; t statistic = 0.47; α = 0.01).

TABLE A19-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.3	8.4	8.2	8.3	8.4	8.4	7.2
Day 1							
0 H	8.5	8.6	8.3	8.1	8.0	8.0	6.9
24 H	8.9	8.8	8.6	8.5	8.5	8.6	7.5
Day 2							
0 H	8.5	8.6	8.4	8.3	8.2	8.2	7.0
24 H	8.9	9.1	9.1	9.0	9.0	9.0	
Day 3							
0 H	8.4	8.7	8.2	8.3	8.1	8.1	6.9
24 H	8.9	8.9	8.9	9.0	8.8	8.7	
Day 4							
0 H	8.3	8.4	8.1	8.2	8.0	8.0	6.8
24 H	8.6	8.8	8.8	8.9	8.7	8.5	
Day 5							
0 H	8.2	8.3	8.0	8.1	8.1	8.1	6.7
24 H	8.7	8.9	8.7	8.7	8.7	8.6	
Day 6							
0 H	8.3	8.3	8.1	8.0	8.0	8.0	6.6
24 H	8.8	8.8	8.8	8.7	8.7	8.5	
Day 7							
24 H	8.9	8.7	8.7	8.7	8.6	8.6	

TABLE A19-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.15	7.29	6.99	6.69	6.48	5.89	3.74
Day 1							
0 H	7.20	7.40	7.01	6.70	6.55	5.96	3.75
24 H	8.00	8.00	7.91	7.88	7.79	7.66	4.55
Day 2							
0 H	6.95	7.10	6.68	6.58	6.34	6.05	3.80
24 H	7.70	7.67	7.75	7.78	7.69	7.63	
Day 3							
0 H	6.97	7.69	7.19	6.95	6.68	6.11	3.84
24 H	7.39	7.10	7.38	7.42	7.49	7.53	
Day 4							
0 H	6.99	7.38	7.12	6.89	6.76	6.49	3.91
24 H	7.58	7.67	7.81	7.82	7.77	7.66	
Day 5							
0 H	7.10	7.27	7.02	6.91	6.52	6.11	3.88
24 H	7.42	7.70	7.75	7.80	7.88	7.71	
Day 6							
0 H	7.05	7.35	7.06	6.88	6.49	5.99	3.79
24 H	7.71	8.00	8.04	8.09	8.12	8.05	
Day 7							
24 H	7.80	7.91	7.86	7.75	7.51	7.37	

TABLE A19-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	240	100	410
Day 1			
0 H	250	110	420
Day 2			
0 H	240	110	410
Day 3			
0 H	250	110	400
Day 4			
0 H	260	110	410
Day 5			
0 H	250	100	420
Day 6			
0 H	240	110	410
Day 7			
24 H	250	110	

TABLE A19-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	35	[a]
Day 1			
0 H	60	30	
Day 2			
0 H	60	35	
Day 3			
0 H	65	30	
Day 4			
0 H	60	30	
Day 5			
0 H	60	35	
Day 6			
0 H	60	35	
Day 7			
24 H	60	30	

[a] Could not obtain measurement.

TABLE A19-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	68	80	100
Day 1			
0 H	60	70	110
Day 2			
0 H	60	70	114
Day 3			
0 H	64	70	110
Day 4			
0 H	68	70	104
Day 5			
0 H	68	84	104
Day 6			
0 H	68	80	110
Day 7			
24 H	64	80	

TABLE A19-2. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
APG-EA Diluent	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	0	0

TABLE A19-3. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 4) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	6	14	16	36
	2	6	12	13	31
	3	5	13	16	34
	4	6	11	20	37
	5	5	13	20	38
	6	4	13	13	30
	7	7	12	12	31
	8	6	11	13	30
	9	6	13	17	36
	10	5	13	16	34
APG-EA Diluent Water	1	6	11	17	34
	2	6	14	16	36
	3	7	13	15	35
	4	7	12	14	33
	5	6	12	13	31
	6	5	11	17	33
	7	7	10	18	35
	8	6	12	17	35
	9	6	11	19	36
	10	6	12	16	34
10	1	6	12	13	31
	2	7	11	13	31
	3	7	8	16	31
	4	10	6	15	31
	5	6	9	15	30
	6	7	9	13	29
	7	4	7	18	29
	8	6	13	18	37
	9	5	11	17	33
	10	3	10	20	33

TABLE A19-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
18	1	6	6	6	18
	2	6	6	0	12
	3	6	8	0	14
	4	6	7	4	17
	5	6	9	6	21
	6	5	4	7	16
	7	6	0	8	14
	8	5	4	7	16
	9	6	12	14	32
	10	4	6	0	10
32	1	5	7	2	14
	2	6	9	11	26
	3	4	0	7	11
	4	4	5	0	9
	5	4	11	10	25
	6	5	7	5	17
	7	5	7	2	14
	8	6	6	DEAD	12
	9	5	9	5	19
	10	5	7	2	14
56	1	0	0	DEAD	0
	2	0	0	1	1
	3	2	3	1	6
	4	2	0	0	2
	5	0	0	0	0
	6	DEAD			0
	7	2	2	0	4
	8	0	2	3	5
	9	0	0	0	0
	10	4	3	1	8
100	1	DEAD			
	2	DEAD			
	3	DEAD			
	4	DEAD			
	5	DEAD			
	6	DEAD			
	7	DEAD			
	8	DEAD			
	9	DEAD			
	10	DEAD			

TABLE A19-4. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	5.42
Alpha value:	0.01
Critical value:	13.28
Conclusion	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	11.90
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	73.51
Alpha value:	0.05
Critical value:	2.61
Conclusion:	Reject the null hypothesis that all groups are equal
Bonferroni t-Test:	
Calculated test statistic:	See Table A19-5
Alpha value:	0.05
Critical value:	2.33
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A19-5. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF BONFERRONI'S T-TEST ON MEAN NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean No. Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	33.7		
10	10	31.5	1.112	
18	10	16.8	8.619	*
32	10	16.1	8.976	*
56	8	2.6	14.641	*

* Significantly different at alpha = 0.05 (Critical Bonferroni value = 2.33).

APPENDIX 20

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-31, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A20-1
Test Organism:	
Scientific Name:	*Ceriodaphnia dubia*
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
pH Buffer:	10 N NaOH

Endpoints: Mortality of adults; number of neonates produced in 3 broods

Water Quality: Table A20-1

4

Results:

<u>Mortality</u>:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. Buffered groundwater did not affect adult survival after 48 h of exposure. The data are summarized in Table A20-2.

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred to the cladocerans at all concentrations down to 32% buffered groundwater by volume (see Tables A20-3, A20-4, and A20-5). The 7-d LC50 for adult mortality, which was determined by the moving average angle method, is as follows:

7-d LC50 = 38.4% buffered groundwater by volume (95% confidence limits = (29.87-47.97).

<u>Neonate Production</u>:

A significant ($\alpha = 0.01$) reduction in neonate production relative to the controls occurred at concentrations down to 18% buffered groundwater by volume. Neonate production was not affected by exposure to 10% buffered groundwater by volume (see Tables A20-3, A20-6, and A20-7). The NOEC and LOEC for exposure of the organism to buffered Canal Creek groundwater are as follows:

NOEC: 10% buffered groundwater by volume
LOEC: 18% buffered groundwater by volume

Table A20-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.4	8.2	8.0	8.3	8.2	7.7
Day 1						
0 H	8.6	8.2	8.3	8.2	8.2	7.6
24 H	8.8	8.7	8.6	8.7	8.6	8.5
Day 2						
0 H	8.6	8.4	8.3	8.3	8.3	7.8
24 H	9.1	8.9	8.8	8.9	8.8	8.9
Day 3						
0 H	8.7	8.3	8.2	8.3	8.2	7.7
24 H	8.9	8.8	8.8	8.8	8.7	8.8
Day 4						
0 H	8.4	8.2	8.1	8.1	8.1	7.6
24 H	8.8	8.7	8.7	8.7	8.6	8.7
Day 5						
0 H	8.3	8.1	8.0	8.0	8.0	7.7
24 H	8.9	8.8	8.7	8.8	8.7	8.6
Day 6						
0 H	8.3	8.2	8.0	7.9	7.8	7.6
24 H	8.8	8.7	8.6	8.7	8.6	8.6
Day 7						
24 H	8.9	8.6	8.7	8.4	8.6	8.5

TABLE A20-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.29	7.63	7.69	7.72	7.81	7.84
Day 1						
0 H	7.40	7.35	7.33	7.31	7.30	7.29
24 H	8.00	7.90	7.95	7.96	7.99	8.11
Day 2						
0 H	7.10	7.22	7.28	7.32	7.36	7.39
24 H	7.67	7.78	7.87	7.95	8.09	8.15
Day 3						
0 H	7.69	7.34	7.43	7.42	7.55	7.20
24 H	7.10	7.80	7.94	8.07	8.28	8.38
Day 4						
0 H	7.38	7.40	7.42	7.47	7.52	7.55
24 H	7.67	7.99	8.20	8.28	8.46	8.69
Day 5						
0 H	7.27	7.31	7.39	7.41	7.42	7.49
24 H	7.70	7.81	7.88	8.00	8.10	8.49
Day 6						
0 H	7.35	7.37	7.37	7.38	7.40	7.49
24 H	7.88	7.88	7.92	7.94	8.02	8.11
Day 7						
24 H	7.91	7.91	7.96	8.00	8.20	8.49

TABLE A20-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	100	320
Day 1		
0 H	110	330
Day 2		
0 H	110	340
Day 3		
0 H	110	330
Day 4		
0 H	110	320
Day 5		
0 H	100	310
Day 6		
0 H	110	330
Day 7		
24 H	110	330

TABLE A20-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	35	25
Day 1		
0 H	30	20
Day 2		
0 H	35	25
Day 3		
0 H	30	20
Day 4		
0 H	30	25
Day 5		
0 H	35	20
Day 6		
0 H	35	25
Day 7		
24 H	35	25

TABLE A20-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	80	70
Day 1		
0 H	70	78
Day 2		
0 H	70	70
Day 3		
0 H	70	70
Day 4		
0 H	70	70
Day 5		
0 H	84	74
Day 6		
0 H	80	70
Day 7		
24 H	70	70

TABLE A20-2. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	10	100

TABLE A20-3. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO.4) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PRODUCED PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	6	14	16	36
	2	6	12	13	31
	3	5	13	16	34
	4	6	11	20	37
	5	5	13	20	38
	6	4	13	13	30
	7	7	12	12	31
	8	6	11	13	30
	9	6	13	17	36
	10	5	13	16	34
10	1	5	13	15	33
	2	8	14	13	35
	3	6	14	12	32
	4	5	12	16	33
	5	6	12	13	31
	6	5	10	19	34
	7	6	11	16	33
	8	5	10	16	31
	9	5	9	15	29
	10	6	9	18	33
18	1	6	10	13	29
	2	6	10	11	27
	3	6	12	15	33
	4	5	5	10	20
	5	5	8	12	25
	6	7	8	8	23
	7	0	7	7	14
	8	7	11	11	29
	9	2	9	8	19
	10	7	7	18	32

TABLE A20-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
32	1	5	0	0	5
	2	4	1	DEAD	5
	3	2	3	1	6
	4	3	2	0	5
	5	5	0	0	5
	6	0	5	DEAD	5
	7	4	10	DEAD	14
	8	4	0	DEAD	4
	9	5	2	0	7
	10	3	0	0	3
56	1	3	1	DEAD	4
	2	5	0	DEAD	5
	3	3	0	DEAD	3
	4	6	DEAD		6
	5	3	0	DEAD	3
	6	6	11	0	17
	7	5	7	0	12
	8	6	0	DEAD	6
	9	1	10	DEAD	11
	10	3	0	DEAD	3
100	1	1	0	DEAD	1
	2	0	0	DEAD	0
	3	5	0	DEAD	5
	4	0	0	DEAD	0
	5	5	0	DEAD	5
	6	0	0	DEAD	0
	7	2	0	DEAD	2
	8	5	DEAD		5
	9	0	0	DEAD	0
	10	0	DEAD		0

TABLE A20-4. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A20-5
Alpha value:	0.05
Critical value:	6
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A20-5. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF FISHER'S EXACT TEST ON ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	10	0		
10	10	0	10	
18	10	0	10	
32	6	4	6	*
56	2	8	2	*
100	0	10	0	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 6).

TABLE A20-6. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	9.38
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	11.39
Alpha value:	0.01
Critical value:	9.21
Conclusion:	Reject the null hypothesis that the variances are homogenous

Steel's Many-One Rank Test:

Calculated test statistic:	See Table A20-7
Alpha value:	0.05
Critical value:	79.0
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 32%, 56% and 100% buffered Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for reproductive effects.

Table A20-7. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO.4) - RESULTS OF STEEL'S MANY-ONE RANK TEST ON NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Neonates Produced	Rank Sum	Critical Value	Significance
UMD/WREC Control	10	33.7			
10	10	32.6	94.0	79.0	
18	10	25.1	63.0	79.0	*

* Significantly different at alpha = 0.05.

APPENDIX 21

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-10, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A21-1
Test Organism:	
Scientific Name:	*Ceriodaphnia dubia*
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A21-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 48-h exposure (Table A21-2). The organisms in all other treatments lived. The 48-h LC50, which was determined by the moving average angle method, is as follows:

48-h LC50 = 64.7% raw groundwater by volume (95% confidence limits = 62.53-67.14).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure; one organism died in the 56% raw groundwater treatment (Table A21-2). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 61.9% raw groundwater by volume (95% confidence limits = 59.66-64.39).

Survival was not affected by exposure to APG-EA diluent water.

Neonate Production:

Raw groundwater significantly ($\alpha = 0.05$) reduced neonate production relative to the controls down to 18% raw groundwater by volume (see Tables A21-3, A21-4, and A21-5). The NOEC and LOEC for the cladocerans, based on reduced neonate production, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Neonate production was not affected by exposure to APG-EA diluent water relative to the UMD/WREC controls (t-test: critical value = 2.88; t statistic = 0.48; $\alpha = 0.01$).

TABLE A21-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 5) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.8	8.5	8.4	8.2	8.3	8.3	7.9
Day 1							
0 H	8.2	8.3	8.4	8.0	8.1	8.2	7.7
24 H	8.6	8.5	8.6	8.6	8.5	8.2	7.7
Day 2							
0 H	8.1	8.2	8.2	8.4	8.5	8.5	7.7
24 H	8.2	8.5	8.6	8.5	8.4	8.3	
Day 3							
0 H	8.6	8.6	8.6	8.6	8.6	8.6	8.0
24 H	8.3	8.4	8.5	8.4	8.5	8.2	
Day 4							
0 H	8.5	8.5	8.2	8.2	8.5	8.2	7.9
24 H	8.2	8.5	8.5	8.5	8.5	8.1	
Day 5							
0 H	8.3	8.6	8.3	8.1	8.1	8.1	7.7
24 H	8.3	8.3	8.0	8.2	8.2	8.1	
Day 6							
0 H	8.7	8.5	8.4	8.4	8.6	8.5	7.8
24 H	8.3	8.0	8.1	8.0	8.1	8.0	
Day 7							
24 H	8.3	8.0	8.1	8.1	8.1	8.0	

TABLE A21-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.28	7.38	7.16	7.05	6.81	6.40	3.76
Day 1							
0 H	7.43	7.53	7.07	6.82	6.66	6.30	3.78
24 H	7.79	8.04	8.08	8.12	7.99	7.88	6.50
Day 2							
0 H	7.40	7.33	7.31	7.02	6.85	6.41	3.79
24 H	8.29	7.94	8.06	8.09	8.05	8.01	
Day 3							
0 H	7.24	7.59	7.33	7.14	6.90	6.47	3.82
24 H	8.18	7.80	7.99	8.02	8.03	7.95	
Day 4							
0 H	7.20	7.45	7.25	7.10	6.87	6.43	3.85
24 H	8.11	7.77	7.80	7.99	8.07	8.00	
Day 5							
0 H	7.04	7.42	6.98	6.92	6.70	6.23	3.81
24 H	8.00	7.35	7.44	7.56	7.58	7.56	
Day 6							
0 H	7.13	7.22	7.06	6.85	6.63	6.22	3.79
24 H	7.71	7.37	7.42	7.41	7.39	7.34	
Day 7							
24 H	7.80	7.40	7.14	7.45	7.49	7.42	

TABLE A21-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	210	170	430
Day 1			
0 H	200	180	700
Day 2			
0 H	200	170	500
Day 3			
0 H	210	170	550
Day 4			
0 H	200	180	500
Day 5			
0 H	220	170	480
Day 6			
0 H	210	170	
Day 7			
24 H	210	170	500

TABLE A21-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	35	50	[a]
Day 1			
0 H	35	50	
Day 2			
0 H	35	55	
Day 3			
0 H	30	55	
Day 4			
0 H	35	50	
Day 5			
0 H	35	50	
Day 6			
0 H	35	50	
Day 7			
24 H	35	50	

[a] Could not obtain measurement.

TABLE A21-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	72	120
Day 1			
0 H	60	70	120
Day 2			
0 H	60	70	120
Day 3			
0 H	60	72	110
Day 4			
0 H	60	70	120
Day 5			
0 H	60	80	130
Day 6			
0 H	60	80	130
Day 7			
24 H	60	80	

TABLE A21-2. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
APG-EA Diluent	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	0	0

TABLE A21-3. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY DATA (TEST NO. 5) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	4	7	14	25
	2	4	12	13	29
	3	5	11	16	32
	4	4	8	12	24
	5	4	8	16	28
	6	5	8	20	33
	7	4	8	20	32
	8	5	8	14	27
	9	5	8	14	27
	10	5	10	19	34
APG-EA Diluent Water	1	5	11	12	28
	2	4	9	12	25
	3	5	9	14	28
	4	5	11	16	32
	5	4	8	14	26
	6	4	10	16	30
	7	5	10	15	30
	8	4	10	20	34
	9	5	11	15	31
	10	5	10	17	32
10	1	4	10	12	26
	2	4	5	19	28
	3	4	9	14	27
	4	5	8	14	27
	5	5	8	14	27
	6	5	7	14	26
	7	5	10	16	31
	8	6	11	12	29
	9	4	8	20	32
	10	5	13	11	29

TABLE A21-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
18	1	4	10	8	22
	2	4	9	10	23
	3	4	5	10	19
	4	4	8	10	22
	5	3	8	16	27
	6	4	9	11	24
	7	5	5	13	23
	8	5	8	11	24
	9	5	8	8	21
	10	3	8	5	16
32	1	5	8	11	24
	2	4	9	10	23
	3	0	4	7	11
	4	4	7	9	20
	5	4	8	9	21
	6	5	9	7	21
	7	4	11	11	26
	8	5	12	8	25
	9	4	8	8	20
	10	4	8	5	17
56	1	0	3	6	9
	2	4	2	4	10
	3	4	6	0	10
	4	2	5	4	11
	5	3	2	7	12
	6	3	1	0	4
	7	2	0	DEAD	2
	8	3	5	9	17
	9	4	0	0	4
	10	4	1	1	6
100	1	DEAD			
	2	DEAD			
	3	DEAD			
	4	DEAD			
	5	DEAD			
	6	DEAD			
	7	DEAD			
	8	DEAD			
	9	DEAD			
	10	DEAD			

TABLE A21-4. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	1.57
Alpha value:	0.01
Critical value:	13.28
Conclusion	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	6.22
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistics:	50.875
Alpha value:	0.05
Critical value:	2.61
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test	
Calculated test statistic:	See Table A21-5
Alpha value:	0.05
Critical value:	2.23
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A21-5. CLADOCERAN CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON MEAN NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean No. Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	28.9		
10	10	28.2	0.430	
18	10	22.1	4.180	*
32	10	20.8	4.979	*
56	10	8.5	12.540	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.23).

APPENDIX 22

CLADOCERAN ACUTE AND 7-DAY SURVIVAL AND REPRODUCTION TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-10, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A22-1
Test Organism:	
Scientific Name:	*Ceriodaphnia dubia*
Age at Start of Test:	<4 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	50 mL glass beaker
Test Solution Volume:	25 mL
No. Organisms/Replicate:	1
No. Organisms/Treatment:	10
Loading:	1 organism/beaker
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal
pH Buffer:	10 N NaOH

Endpoints:	Mortality of adults; number of neonates produced in 3 broods
Water Quality:	Table A22-1

Results:

Mortality:

48-h Exposure:

The data for the 48-h LC50 were obtained from the 7-d study. Buffered groundwater did not affect adult survival after 48 h of exposure. The data are summarized in Table A22-2.

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred to the cladocerans exposed to 100% buffered groundwater by volume (see Tables A22-3, A22-4, and A22-5). The 7-d LC50 for adult mortality, which was determined by the moving average angle method, is as follows:

7-d LC50 = 73.9% buffered groundwater by volume (95% confidence limits = (69.53-79.23).

Neonate Production:

A significant ($\alpha = 0.01$) reduction in neonate production relative to the controls occurred at concentrations down to 32% buffered groundwater by volume. Neonate production was not affected by exposure to 10% or 18% buffered groundwater by volume (see Tables A22-3, A22-6, and A22-7). The NOEC and LOEC for exposure of the organism to buffered Canal Creek groundwater are as follows:

NOEC: 18% buffered groundwater by volume
LOEC: 32% buffered groundwater by volume

Table A22-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE CLADOCERAN 7-DAY TEST (TEST NO. 5) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.5	8.5	8.5	8.3	8.3	8.4
Day 1						
0 H	8.6	8.1	8.2	8.2	8.2	8.0
24 H	8.5	8.2	8.2	8.2	8.3	8.3
Day 2						
0 H	8.2	8.1	8.0	8.0	8.1	8.2
24 H	8.5	8.0	8.4	8.4	8.5	8.6
Day 3						
0 H	8.6	8.6	8.5	8.3	8.2	8.2
24 H	8.4	8.1	8.3	8.3	8.4	8.5
Day 4						
0 H	8.5	8.5	8.4	8.4	8.3	8.1
24 H	8.5	8.0	8.2	8.2	8.3	8.4
Day 5						
0 H	8.6	8.0	8.1	8.0	8.0	8.1
24 H	8.3	8.3	8.3	8.0	8.1	8.2
Day 6						
0 H	8.5	8.7	8.5	8.6	8.6	8.6
24 H	8.0	8.0	8.1	8.1	8.0	8.0
Day 7						
24 H	8.0	8.0	8.1	8.0	8.0	8.0

TABLE A22-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.38	7.30	7.34	7.40	7.40	7.21
Day 1						
0 H	7.53	7.38	7.45	7.46	7.47	7.26
24 H	8.04	7.93	8.03	8.19	8.31	8.36
Day 2						
0 H	7.33	7.38	7.35	7.31	7.30	7.30
24 H	7.94	8.29	8.36	8.37	8.40	8.41
Day 3						
0 H	7.59	7.50	7.56	7.59	7.58	7.46
24 H	7.80	8.15	8.22	8.29	8.33	8.37
Day 4						
0 H	7.45	7.49	7.41	7.37	7.27	7.21
24 H	7.77	8.13	8.25	8.30	8.39	8.49
Day 5						
0 H	7.42	7.34	7.43	7.45	7.47	7.20
24 H	7.35	7.61	7.68	7.80	7.90	7.99
Day 6						
0 H	7.22	7.23	7.29	7.36	7.40	7.38
24 H	7.37	7.54	7.59	7.66	7.71	7.77
Day 7						
24 H	7.40	7.51	7.65	7.70	7.80	7.83

TABLE A22-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	170	800
Day 1		
0 H	180	780
Day 2		
0 H	170	790
Day 3		
0 H	170	800
Day 4		
0 H	180	800
Day 5		
0 H	170	780
Day 6		
0 H	170	780
Day 7		
24 H	170	780

TABLE A22-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	50	90
Day 1		
0 H	50	100
Day 2		
0 H	55	100
Day 3		
0 H	55	90
Day 4		
0 H	50	90
Day 5		
0 H	50	90
Day 6		
0 H	50	90
Day 7		
24 H	55	100

TABLE A22-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	72	70
Day 1		
0 H	70	70
Day 2		
0 H	70	70
Day 3		
0 H	72	70
Day 4		
0 H	70	70
Day 5		
0 H	70	70
Day 6		
0 H	80	80
Day 7		
24 H	80	70

TABLE A22-2. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - SURVIVAL AFTER 48 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Number Tested	No. Alive at 48 Hours	Percent Alive
UMD/WREC Control	10	10	100
10	10	10	100
18	10	10	100
32	10	10	100
56	10	10	100
100	10	10	100

TABLE A22-3. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY DATA (TEST NO.5) - SURVIVAL OF ADULTS, NUMBER OF YOUNG PRODUCED PER BROOD, TOTAL NUMBER OF YOUNG, AND MEAN NUMBER OF YOUNG PRODUCED PER BROOD AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
UMD/WREC Control	1	4	7	14	25
	2	4	12	13	29
	3	5	11	16	32
	4	4	8	12	24
	5	4	8	16	28
	6	5	8	20	33
	7	4	8	20	32
	8	5	8	14	27
	9	5	8	12	25
	10	5	10	19	34
10	1	4	9	13	26
	2	6	9	16	31
	3	4	8	13	25
	4	4	8	13	25
	5	4	8	19	31
	6	6	12	13	31
	7	4	7	14	25
	8	4	7	18	29
	9	4	7	17	28
	10	5	8	12	25
18	1	3	9	13	25
	2	5	9	17	31
	3	3	8	15	26
	4	4	6	17	27
	5	4	8	12	24
	6	2	6	7	15
	7	5	11	13	29
	8	2	13	11	26
	9	4	7	13	24
	10	5	11	11	27

TABLE A22-3. (CONTINUED)

Conc (% by Vol)	Rep	Brood No. 1	Brood No. 2	Brood No. 3	Total Young
32	1	4	8	4	16
	2	2	5	9	16
	3	4	6	17	27
	4	5	10	9	24
	5	5	8	0	13
	6	5	9	11	25
	7	4	9	10	23
	8	4	8	12	24
	9	3	6	7	16
	10	2	7	6	15
56	1	0	0	0	0
	2	2	2	4	8
	3	3	4	0	7
	4	0	4	0	4
	5	0	0	0	0
	6	4	0	0	4
	7	2	0	0	2
	8	5	2	0	7
	9	3	0	DEAD	3
	10	5	7	0	12
100	1	4	0	0	4
	2	3	0	DEAD	3
	3	4	0	DEAD	4
	4	4	0	DEAD	4
	5	3	0	0	3
	6	4	DEAD		4
	7	3	0	DEAD	3
	8	2	DEAD		2
	9	1	0	DEAD	1
	10	1	0	DEAD	1

TABLE A22-4. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A22-5
Alpha value:	0.05
Critical value:	6
Conclusion:	Reject the null hypothesis that all groups are equal.

TABLE A22-5. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF FISHER'S EXACT TEST ON ADULT SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	10	0		
10	10	0	10	
18	10	0	10	
32	10	0	10	
56	9	1	9	
100	2	8	2	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 6).

TABLE A22-6. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	10.11
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	3.53
Alpha value:	0.01
Critical value:	9.21
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	61.49
Alpha value:	0.05
Critical value:	2.61
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A22-7
Alpha value:	0.05
Critical value:	2.23
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 100% buffered Canal Creek groundwater treatment was not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for reproductive effects.

Table A22-7. CLADOCERAN CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO.5) - RESULTS OF DUNNETT'S TEST ON NEONATE PRODUCTION AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Neonates Produced	T Statistic	Significance
UMD/WREC Control	10	28.9		
10	10	27.6	0.728	
18	10	25.4	1.960	
32	10	19.9	5.043	*
56	10	4.7	13.559	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.23).

APPENDIX 23

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	September 13-20, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A23-1
Test Organism:	
Scientific Name:	Pimephales promelas
Dry Weight:	0.58 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles

Aeration:	Prior to each renewal
Endpoints:	Mortality; growth
Water Quality:	Table A23-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 96-h exposure (Table A23-2). 85% of the organisms died at 56% groundwater by volume. The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 46.1% raw groundwater by volume (95% confidence limits = 41.59-51.33).

7-d Exposure:

All organisms exposed to 100% raw groundwater died during the 7-d exposure (Table A23-3). 95% of the organisms died at 56% groundwater by volume; two deaths occurred at both 10% and 32% groundwater by volume. A single organism died at 18% groundwater by volume. The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 42.1% raw groundwater by volume (95% confidence limits = 37.94-46.74).

Fathead minnow survival was not affected by exposure to APG-EA diluent water relative to the UMD/WREC controls.

Growth:

A significant (α = 0.05) reduction in growth occurred in fathead minnow larvae exposed for 7 d to 32% raw groundwater by volume (see Tables A23-3 A23-4, and A23-5). The NOEC and LOEC for the larval fish, based on reduced growth, are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

Larval growth was not affected by exposure to APG-EA diluent water relative to UMD/WREC controls (t-test: critical value = 3.71; t statistic = 1.37; α = 0.01).

TABLE A23-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.4	8.3	8.2	8.1	8.2	7.9	7.9
Day 1							
0 H	8.1	8.2	8.2	8.3	8.2	8.2	8.3
24 H	8.0	8.1	8.0	8.0	8.1	8.0	8.2
Day 2							
0 H	7.8	8.3	8.2	8.3	8.1	8.4	8.0
24 H	7.5	7.7	7.5	7.5	7.7	7.7	
Day 3							
0 H	7.9	8.4	8.1	8.2	8.2	8.3	8.1
24 H	7.6	8.0	7.7	7.6	7.8	7.6	
Day 4							
0 H	8.1	8.4	8.2	8.3	8.4	8.3	8.1
24 H	7.8	8.1	7.9	7.7	7.6	7.4	
Day 5							
0 H	8.2	8.4	8.1	8.1	8.3	8.2	8.2
24 H	7.6	8.1	7.7	7.8	7.7	7.6	
Day 6							
0 H	8.1	8.3	8.2	8.2	8.2	8.1	8.1
24 H	7.5	8.0	7.9	7.9	7.6	7.5	
Day 7							
24 H	7.7	8.1	8.0	7.9	7.7	7.7	

TABLE A23-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	6.91	7.14	7.04	6.96	6.74	6.10	3.96
Day 1							
0 H	7.00	7.22	7.16	7.02	6.88	6.30	3.98
24 H	6.82	6.91	7.03	7.12	7.16	7.12	5.31
Day 2							
0 H	6.95	7.05	7.03	6.98	6.93	6.41	3.95
24 H	6.76	6.74	6.87	6.91	7.00	6.99	
Day 3							
0 H	7.01	7.14	7.10	6.88	6.81	6.27	3.99
24 H	6.90	6.81	6.91	6.95	7.04	6.79	
Day 4							
0 H	7.39	7.79	7.73	7.60	7.38	6.69	3.96
24 H	7.41	7.14	7.11	7.23	7.70	7.83	
Day 5							
0 H	7.29	7.65	7.58	7.39	7.09	6.38	3.95
24 H	7.29	7.11	7.21	7.33	7.20	7.06	
Day 6							
0 H	7.19	7.40	7.33	7.30	7.01	6.29	3.99
24 H	7.31	7.29	7.24	7.26	7.12	7.02	
Day 7							
24 H	7.21	7.15	7.15	7.31	7.16	7.06	

TABLE A23-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	290	160	410
Day 1			
0 H	260	170	400
Day 2			
0 H	200	175	410
Day 3			
0 H	210	170	400
Day 4			
0 H	200	160	410
Day 5			
0 H	200	160	420
Day 6			
0 H	200	160	
Day 7			
24 H	210	165	420

TABLE A23-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	50	45	[a]
Day 1			
0 H	55	50	
Day 2			
0 H	50	50	
Day 3			
0 H	50	40	
Day 4			
0 H	55	50	
Day 5			
0 H	50	40	
Day 6			
0 H	55	40	
Day 7			
24 H	50	40	

[a] Could not obtain measurement.

TABLE A23-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	68	68	[a]
Day 1			
0 H	72	72	
Day 2			
0 H	68	64	
Day 3			
0 H	72	68	
Day 4			
0 H	72	72	
Day 5			
0 H	64	68	
Day 6			
0 H	68	64	
Day 7			
24 H	70	64	

[a] Could not obtain measurement.

TABLE A23-2. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
APG-EA Diluent Water	A	10	9	90
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	9	90
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	9	90
56	A	10	3	30
	B	10	1	10
	C	10	0	00
	D	10	2	20
100	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0

TABLE A23-3. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.60	
	2	10	100	0.60	
	3	10	100	0.57	
	4	10	100	0.56	0.58
APG-EA Diluent Water	1	9	90	0.62	
	2	10	100	0.60	
	3	10	100	0.57	
	4	10	100	0.64	0.61
10	1	9	90	0.62	
	2	10	100	0.65	
	3	9	90	0.55	
	4	10	100	0.61	0.61
18	1	9	90	0.62	
	2	10	100	0.55	
	3	10	100	0.66	
	4	10	100	0.60	0.61
32	1	10	100	0.50	
	2	10	100	0.48	
	3	9	90	0.46	
	4	9	90	0.49	0.48
56	1	0	0	0.00	
	2	1	10	0.12	
	3	0	0	0.00	
	4	1	10	0.33	0.11
100	1	0	0		
	2	0	0		
	3	0	0		
	4	0	0		

TABLE A23-4. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-Square Test for Normality:

Calculated test statistic:	5.37
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	0.13
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous.

ANOVA:

Calculated test statistic:	124.1
Alpha value:	0.01
Critical value:	3.06
Conclusion:	Reject the null hypothesis that all groups are equal.

Dunnett's Test:

Calculated test statistic:	See Table A23-5
Alpha value:	0.05
Critical value:	2.36
Conclusion:	Reject the null hypothesis that all groups are equal.

---

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A23-5. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Survival (%)[a]	T Statistic	Significance
UMD/WREC Control	4	100		
10	4	95.0	0.65	
18	4	97.5	0.00	
32	4	95.0	0.65	
56	4	5.0	17.91	*

[a] Values given are actual percent survival means rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.36).

TABLE A23-6. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	2.80
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	3.47
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	12.41
Alpha value:	0.05
Critical value:	3.49
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A23-7
Alpha value:	0.05
Critical value:	2.29
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A23-7. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Dry Weight (mg)	T Statistic	Significance
UMD/WREC Control	4	0.58		
10	4	0.61	-1.05	
18	4	0.61	-1.05	
32	4	0.48	4.19	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.29).

APPENDIX 24

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANALCREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	September 13-20, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A24-1
Test Organism:	
Scientific Name:	<u>Pimephales</u> <u>promelas</u>
Dry Weight:	0.58 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; growth
Water Quality:	Table A24-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival. The data are summarized in Table A24-2.

7-d Exposure:

The survival of fathead minnow larvae was not affected after 7 days of exposure to Canal Creek buffered groundwater (Table A24-3).

Growth:

Fathead minnow larval growth was not affected by exposure to buffered Canal Creek groundwater (see Tables A24-3, A24-4, and A24-5).

TABLE A24-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.3	8.1	8.1	7.9	8.0	7.7
Day 1						
0 H	8.1	8.0	7.8	7.9	8.0	8.0
24 H	8.2	7.8	7.6	7.7	7.7	7.8
Day 2						
0 H	8.3	8.2	8.1	8.3	8.3	8.2
24 H	7.7	7.6	7.5	7.6	7.7	7.6
Day 3						
0 H	8.4	8.3	8.2	8.3	8.2	8.1
24 H	8.0	7.8	7.7	7.7	7.6	7.5
Day 4						
0 H	8.4	8.2	8.3	8.1	8.0	8.1
24 H	8.1	7.9	7.9	7.6	7.5	7.7
Day 5						
0 H	8.4	8.1	8.2	8.2	8.0	8.1
24 H	8.1	7.9	8.0	7.9	7.6	7.6
Day 6						
0 H	8.3	8.2	8.3	8.2	8.2	8.1
24 H	8.0	8.0	8.1	7.6	7.7	7.7
Day 7						
24 H	8.1	7.9	8.0	7.7	7.8	7.6

TABLE A24-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.24	7.18	7.15	7.14	7.06	7.02
Day 1						
0 H	7.22	7.12	7.19	7.25	7.30	7.25
24 H	6.91	6.83	7.02	7.12	7.16	7.21
Day 2						
0 H	7.05	7.11	7.21	7.24	7.28	7.29
24 H	6.74	7.00	7.01	7.07	7.16	7.23
Day 3						
0 H	7.14	7.15	7.26	7.29	7.31	7.38
24 H	6.90	7.05	7.07	7.12	7.24	7.30
Day 4						
0 H	7.79	7.57	7.74	7.78	7.71	7.59
24 H	7.14	7.68	7.81	7.88	7.92	7.96
Day 5						
0 H	7.65	7.31	7.29	7.19	7.18	7.09
24 H	7.29	7.54	7.62	7.69	7.73	7.80
Day 6						
0 H	7.40	7.27	7.25	7.23	7.19	7.18
24 H	7.29	7.44	7.50	7.56	7.58	7.66
Day 7						
24 H	7.15	7.50	7.47	7.52	7.69	7.71

TABLE A24-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	160	510
Day 1		
0 H	170	500
Day 2		
0 H	175	500
Day 3		
0 H	170	510
Day 4		
0 H	160	500
Day 5		
0 H	160	510
Day 6		
0 H	165	520
Day 7		
24 H	155	515

TABLE A24-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	45	40
Day 1		
0 H	50	40
Day 2		
0 H	50	40
Day 3		
0 H	50	40
Day 4		
0 H	55	45
Day 5		
0 H	50	60
Day 6		
0 H	55	55
Day 7		
24 H	45	50

TABLE A24-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	120
Day 1		
0 H	72	100
Day 2		
0 H	64	110
Day 3		
0 H	68	110
Day 4		
0 H	72	120
Day 5		
0 H	64	110
Day 6		
0 H	68	110
Day 7		
24 H	65	120

TABLE A24-2. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
100	A	10	10	100
	B	10	10	100
	C	10	9	90
	D	10	10	100

TABLE A24-3. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.60	
	2	10	100	0.60	
	3	10	100	0.57	
	4	10	100	0.56	0.58
10	1	9	90	0.63	
	2	10	100	0.51	
	3	10	100	0.59	
	4	10	100	0.62	0.59
18	1	9	90	0.62	
	2	10	100	0.64	
	3	10	100	0.59	
	4	10	100	0.60	0.62
32	1	10	100	0.46	
	2	9	90	0.58	
	3	9	90	0.53	
	4	10	100	0.48	0.51
56	1	9	90	0.55	
	2	10	100	0.62	
	3	10	100	0.54	
	4	10	100	0.47	0.55
100	1	7	70	0.48	
	2	10	100	0.56	
	3	9	90	0.58	
	4	10	100	0.49	0.53

TABLE A24-4. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	9.89
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	4.86
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	0.59
Alpha value:	0.05
Critical Value:	2.77
Conclusion:	Fail to reject the null hypothesis that all groups are equal

APPENDIX 25

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH
TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4)
GROUNDWATER (WELL CC-27B)
(TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	November 8-15, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A25-1
Test Organism:	
Scientific Name:	<u>Pimephales</u> <u>promelas</u>
Dry Weight:	0.72 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles

Aeration:	Prior to each renewal
Endpoints:	Mortality; growth
Water Quality:	Table A25-1

Results:

<u>Mortality</u>:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 96-h exposure; 20% or less of the organisms died at the lower test concentrations (Table A25-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 60.4% raw groundwater by volume (95% confidence limits = 56.71-64.67).

7-d Exposure:

Significant (α = 0.05) mortality occurred in fathead minnow larvae exposed to 100% and 56% groundwater by volume for 7 d (see Tables A25-3, A25-4, and A25-5). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 44.9% raw groundwater by volume (95% confidence limits = 40.32-50.28).

The NOEC and LOEC for the larval fish, based on mortality are as follows:

NOEC = 32% raw groundwater by volume.
LOEC = 56% raw groundwater by volume.

All organisms exposed to APG-EA diluent water survived.

<u>Growth</u>:

The growth of fathead minnow larvae was not affected by a 7-d exposure to concentrations which ranged from 10% to 32% groundwater by volume (see Tables A25-3 and A25-6).

Fathead minnow larval growth was not affected by 7 d of exposure to APG-EA diluent water relative to the UMD/WREC control fish (t-test: critical value = 3.71; t statistic = 0.17; α = 0.01).

TABLE A25-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.6	8.6	8.2	8.1	8.0	8.1	7.5
Day 1							
0 H	8.2	8.6	8.2	8.3	8.4	8.0	7.8
24 H	7.6	8.3	8.0	8.0	7.9	7.8	7.7
Day 2							
0 H	8.1	8.5	8.1	8.2	8.2	8.0	7.1
24 H	7.5	7.3	7.0	7.3	7.5	7.5	
Day 3							
0 H	8.0	8.5	8.0	8.1	8.1	8.0	7.0
24 H	7.4	7.4	7.3	7.5	7.4	7.3	
Day 4							
0 H	8.1	8.5	8.0	8.1	8.1	8.0	7.0
24 H	7.5	7.5	7.2	7.7	7.6	7.2	
Day 5							
0 H	8.0	8.4	8.1	8.0	8.0	8.0	7.0
24 H	7.4	7.4	7.1	7.6	7.7	7.1	
Day 6							
0 H	8.0	8.3	8.1	8.0	8.0	8.0	7.0
24 H	7.3	7.5	7.0	7.4	7.6	7.0	
Day 7							
24 H	7.2	7.6	7.1	7.2	7.6	7.2	

TABLE A25-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.15	7.73	7.17	6.94	6.69	6.30	3.80
Day 1							
0 H	7.11	7.57	7.25	6.91	6.61	6.21	3.69
24 H	7.07	7.61	7.21	7.13	6.97	6.98	4.20
Day 2							
0 H	7.18	8.04	7.76	7.62	7.18	6.84	3.75
24 H	7.40	7.71	7.59	7.47	7.32	7.98	
Day 3							
0 H	7.19	7.77	7.70	7.54	7.11	6.51	3.69
24 H	7.45	7.77	7.51	7.66	7.27	7.00	
Day 4							
0 H	7.20	7.70	7.15	6.99	6.79	6.34	3.46
24 H	7.35	7.90	7.49	7.41	7.35	7.11	
Day 5							
0 H	7.15	7.75	7.20	7.00	6.55	6.23	3.53
24 H	7.40	7.75	7.51	7.47	7.44	7.09	
Day 6							
0 H	7.19	7.70	7.22	6.95	6.60	6.17	3.36
24 H	7.16	7.41	7.19	7.15	7.13	7.11	
Day 7							
24 H	6.99	7.10	7.06	7.00	6.92	6.86	

TABLE A25-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	200	290	450
Day 1			
0 H	190	280	440
Day 2			
0 H	190	280	450
Day 3			
0 H	190	280	450
Day 4			
0 H	200	290	450
Day 5			
0 H	200	280	450
Day 6			
0 H	200	280	440
Day 7			
24 H	[a]	[a]	[a]

[a] Measurement not taken.

TABLE A25-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	25	60	[a]
Day 1			
0 H	30	55	
Day 2			
0 H	30	50	
Day 3			
0 H	30	50	
Day 4			
0 H	30	60	
Day 5			
0 H	25	55	
Day 6			
0 H	30	50	
Day 7			
24 H	[b]	[b]	

[a] Could not obtain measurement.
[b] Measurement not taken.

TABLE A25-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	52	100	120
Day 1			
0 H	50	96	124
Day 2			
0 H	52	96	128
Day 3			
0 H	50	100	124
Day 4			
0 H	50	96	120
Day 5			
0 H	50	100	120
Day 6			
0 H	52	100	128
Day 7			
24 H	[a]	[a]	

[a] Measurement not taken.

TABLE A25-2. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
APG-EA Diluent Water	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	8	80
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	7	70
	B	10	9	90
	C	10	9	90
	D	10	7	70
100	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0

TABLE A25-3. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.71	
	2	10	100	0.72	
	3	10	100	0.72	
	4	10	100	0.74	0.72
APG-EA Diluent Water	1	10	100	0.72	
	2	10	100	0.65	
	3	10	100	0.79	
	4	10	100	0.75	0.73
10	1	10	100	0.79	
	2	9	90	0.72	
	3	10	100	0.68	
	4	10	100	0.79	0.75
18	1	8	80	0.71	
	2	10	100	0.79	
	3	10	100	0.76	
	4	10	100	0.70	0.74
32	1	10	100	0.67	
	2	10	100	0.75	
	3	9	90	0.73	
	4	10	100	0.68	0.71
56	1	0	0	0.00	
	2	2	20	0.38	
	3	2	20	0.47	
	4	1	10	0.33	0.30
100	1	0	0		
	2	0	0		
	3	0	0		
	4	0	0		

TABLE A25-4. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-Square Test for Normality:

Calculated test statistic:	9.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Test could not be performed because at least one treatment group has zero variance.

Steel's Many-One Rank Test:

Calculated test statistic:	See Table A25-5
Alpha value:	0.05
Critical value:	10.00
Conclusion:	Reject the null hypothesis that all groups are equal.

---

[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A25-5. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF STEEL'S MANY-ONE RANK TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Percent Mean Survival[a]	Rank Sum	Critical Value	Significance
UMD/WREC Control	4	100			
10	4	97.5	16.0	10.0	
18	4	95.0	16.0	10.0	
32	4	97.5	16.0	10.0	
56	4	12.5	10.0	10.0	*

[a] Values given are actual percent survival means rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05.

TABLE A25-6. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	5.21
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	4.37
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	0.73
Alpha value:	0.05
Critical value:	3.49
Conclusion:	Fail to reject the null hypothesis that all groups are equal

APPENDIX 26

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	November 8-15, 1994
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A26-1
Test Organism:	
Scientific Name:	Pimephales promelas
Dry Weight:	0.72 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; growth
Water Quality:	Table A26-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival (Table A26-2).

7-d Exposure:

The survival of fathead minnow larvae was not affected after 7 days of exposure to Canal Creek buffered groundwater (Table A26-3).

Growth:

Fathead minnow larval growth was not affected by exposure to buffered Canal Creek groundwater (see Tables A26-3, A26-4, and A26-5).

TABLE A26-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.6	7.8	7.8	7.8	7.9	7.7
Day 1						
0 H	8.6	8.2	8.2	8.1	8.1	7.6
24 H	8.3	7.7	8.0	7.8	7.8	7.9
Day 2						
0 H	8.5	8.2	8.2	8.2	8.3	7.8
24 H	7.3	7.7	7.7	7.6	7.5	7.3
Day 3						
0 H	8.5	8.1	8.1	8.3	8.2	7.7
24 H	7.4	7.6	7.6	7.7	7.6	7.1
Day 4						
0 H	8.5	8.2	8.5	8.3	8.1	7.9
24 H	7.5	7.7	7.7	7.6	7.7	7.0
Day 5						
0 H	8.4	8.1	8.0	8.3	8.2	8.0
24 H	7.4	7.8	7.5	7.5	7.5	7.3
Day 6						
0 H	8.3	8.0	8.1	8.0	8.0	8.0
24 H	7.5	7.6	7.4	7.6	7.4	7.2
Day 7						
24 H	7.6	7.5	7.5	7.5	7.3	7.1

TABLE A26-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.73	7.54	7.52	7.46	7.41	7.38
Day 1						
0 H	7.57	7.53	7.67	7.72	7.76	7.79
24 H	7.61	7.46	7.43	7.47	7.55	7.65
Day 2						
0 H	8.04	7.90	7.80	7.70	7.63	7.38
24 H	8.16	7.69	7.79	7.83	7.90	7.98
Day 3						
0 H	7.77	7.67	7.71	7.71	7.52	7.46
24 H	8.00	7.57	7.69	7.70	7.72	7.76
Day 4						
0 H	7.70	7.60	7.56	7.50	7.40	7.41
24 H	7.90	7.60	7.65	7.70	7.72	7.76
Day 5						
0 H	7.75	7.52	7.37	7.26	7.21	7.14
24 H	7.75	7.62	7.70	7.67	7.77	7.81
Day 6						
0 H	7.70	7.23	7.22	7.20	7.12	7.08
24 H	7.41	7.25	7.26	7.27	7.32	7.38
Day 7						
24 H	7.10	6.95	7.00	7.14	7.13	7.19

TABLE A26-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	290	790
Day 1		
0 H	280	800
Day 2		
0 H	280	810
Day 3		
0 H	280	800
Day 4		
0 H	290	800
Day 5		
0 H	280	800
Day 6		
0 H	280	800
Day 7		
24 H	280	810

TABLE A26-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	60	85
Day 1		
0 H	55	80
Day 2		
0 H	50	85
Day 3		
0 H	50	80
Day 4		
0 H	60	80
Day 5		
0 H	55	80
Day 6		
0 H	50	85
Day 7		
24 H	45	80

TABLE A26-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	100	60
Day 1		
0 H	96	56
Day 2		
0 H	96	60
Day 3		
0 H	100	60
Day 4		
0 H	96	60
Day 5		
0 H	100	56
Day 6		
0 H	100	60
Day 7		
24 H	96	56

TABLE A26-2. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	10	100
	B	10	10	100
	C	10	9	90
	D	10	10	100
100	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100

TABLE A26-3. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.71	
	2	10	100	0.72	
	3	10	100	0.72	
	4	10	100	0.74	0.72
10	1	10	100	0.70	
	2	10	100	0.71	
	3	10	100	0.79	
	4	10	100	0.68	0.72
18	1	10	100	0.70	
	2	9	90	0.66	
	3	10	100	0.71	
	4	10	100	0.68	0.69
32	1	10	100	0.64	
	2	9	90	0.64	
	3	9	90	0.73	
	4	10	100	0.67	0.67
56	1	9	90	0.65	
	2	10	100	0.62	
	3	9	90	0.79	
	4	9	90	0.61	0.67
100	1	10	100	0.74	
	2	9	90	0.65	
	3	8	80	0.65	
	4	10	100	0.68	0.68

TABLE A26-4. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	5.36
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	9.23
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1.05
Alpha value:	0.05
Critical Value:	2.77
Conclusion:	Fail to reject the null hypothesis that all groups are equal

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APPENDIX 27

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	January 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A27-1
Test Organism:	
Scientific Name:	Pimephales promelas
Dry Weight:	0.82 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles

Aeration:	Prior to each renewal
Endpoints:	Mortality; growth
Water Quality:	Table A27-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. All organisms exposed to 56% and 100% raw groundwater died during the 96-h exposure; 37.5% of the organisms exposed to 32% raw groundwater died during the 96-h exposure (Table A27-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 38.9% raw groundwater by volume (95% confidence limits = 35.91-41.73).

7-d Exposure:

Significant ($\alpha = 0.05$) mortality occurred in fathead minnow larvae exposed to 100%, 56% and 32% groundwater by volume for 7 d (see Tables A27-3, A27-4, and A27-5). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 31.9% raw groundwater by volume (95% confidence limits = 28.84-36.00).

The NOEC and LOEC for the larval fish, based on mortality are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

Fathead minnow larval survival was not affected by exposure to APG-EA diluent water relative to UMD/WREC controls after 7 d of exposure.

Growth:

The growth of fathead minnow larvae was not affected by a 7-d exposure to concentrations below 32% groundwater by volume (see Tables A27-3 and A27-6).

Larval growth was not affected by 7 d of exposure to APG-EA diluent water relative to the UMD/WREC control fish.

TABLE A27-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.8	8.1	8.2	7.8	7.8	7.6	6.7
Day 1							
0 H	8.7	8.4	8.3	8.2	8.2	7.6	7.0
24 H	7.9	7.9	7.9	8.0	8.0	8.1	8.2
Day 2							
0 H	8.3	8.8	8.7	8.7	8.5	7.8	7.1
24 H	7.0	7.2	7.2	7.3	7.4	7.6	
Day 3							
0 H	8.5	8.6	8.5	8.5	8.3	8.1	7.0
24 H	6.7	7.9	7.0	7.2	7.7	7.8	
Day 4							
0 H	8.6	8.5	8.4	8.3	8.2	8.2	7.2
24 H	6.9	7.7	7.1	7.3	7.6		
Day 5							
0 H	8.5	8.4	8.4	8.3	8.2	8.2	7.2
24 H	7.0	7.6	7.0	7.2	7.4		
Day 6							
0 H	8.5	8.5	8.3	8.3	8.5	8.1	7.0
24 H	6.5	6.5	6.1	6.0	6.1		
Day 7							
24 H	7.5	7.7	7.6	7.5	7.5		

TABLE A27-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.66	7.21	6.69	6.32	6.01	5.41	3.67
Day 1							
0 H	7.62	7.54	7.11	6.69	6.27	5.67	3.74
24 H	7.25	7.14	7.15	7.15	7.08	6.91	4.75
Day 2							
0 H	7.59	7.21	6.89	6.66	6.26	5.23	3.79
24 H	7.52	6.93	6.97	6.91	6.86	6.49	
Day 3							
0 H	7.51	7.37	7.12	6.80	6.35	5.47	3.71
24 H	7.53	6.96	6.97	6.95	6.91	6.28	
Day 4							
0 H	7.50	7.20	6.86	6.81	6.64	5.99	3.79
24 H	7.51	7.07	7.10	7.11	7.12		
Day 5							
0 H	7.48	7.63	7.54	7.23	6.88	6.23	3.84
24 H	7.59	7.43	7.46	7.43	7.25		
Day 6							
0 H	7.49	7.49	7.23	7.02	6.61	5.97	3.79
24 H	7.11	7.21	7.13	7.08	7.07		
Day 7							
24 H	7.38	7.24	7.33	7.35	7.36		

TABLE A27-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	250	110	410
Day 1			
0 H	250	110	400
Day 2			
0 H	250	100	400
Day 3			
0 H	250	110	410
Day 4			
0 H	240	110	400
Day 5			
0 H	250	110	410
Day 6			
0 H	240	100	420
Day 7			
24 H	[a]	[a]	[a]

[a] Measurement not taken.

TABLE A27-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	30	[a]
Day 1			
0 H	65	35	
Day 2			
0 H	60	30	
Day 3			
0 H	60	35	
Day 4			
0 H	60	30	
Day 5			
0 H	60	35	
Day 6			
0 H	65	30	
Day 7			
24 H	[b]	[b]	

[a] Could not obtain measurement.
[b] Measurement not taken.

TABLE A27-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	52	44	110
Day 1			
0 H	56	40	100
Day 2			
0 H	56	44	100
Day 3			
0 H	56	44	110
Day 4			
0 H	56	40	100
Day 5			
0 H	56	44	110
Day 6			
0 H	52	40	110
Day 7			
24 H	[a]	[a]	[a]

[a] Measurement not taken.

TABLE A27-2. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
APG-EA Diluent Water	A	10	9	90
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	3	30
	B	10	8	80
	C	10	6	60
	D	10	8	80
56	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0
100	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0

TABLE A27-3. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.80	
	2	10	100	0.84	
	3	10	100	0.81	
	4	10	100	0.83	0.82
APG-EA Diluent Water	1	9	90	0.86	
	2	10	100	0.76	
	3	10	100	0.82	
	4	10	100	0.84	0.82
10	1	10	100	0.72	
	2	10	100	0.88	
	3	10	100	0.77	
	4	10	100	0.81	0.80
18	1	10	100	0.80	
	2	10	100	0.74	
	3	10	100	0.68	
	4	10	100	0.72	0.74
32	1	3	30	0.60	
	2	6	60	0.55	
	3	5	50	0.40	
	4	6	60	0.55	0.53
56	1	0	0		
	2	0	0		
	3	0	0		
	4	0	0		
100	1	0	0		
	2	0	0		
	3	0	0		
	4	0	0		

TABLE A27-4. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-Square Test for Normality:

Calculated test statistic:	12.94
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Test could not be performed because at least one treatment group has zero variance.

Steel's Many-One Rank Test:

Calculated test statistic:	See Table A27-5
Alpha value:	0.05
Critical value:	10.00
Conclusion:	Reject the null hypothesis that all groups are equal.

---

[a] The 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all organisms died during the test.

TABLE A27-5. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF STEEL'S MANY-ONE RANK TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Percent Mean Survival[a]	Rank Sum	Critical Value	Significance
UMD/WREC Control	4	100			
10	4	100	18.0	10.0	
18	4	100	18.0	10.0	
32	4	50.0	10.0	10.0	*

[a] Values given are actual percent survival means rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05.

TABLE A27-6. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	2.51
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	3.35
Alpha value:	0.01
Critical value:	9.21
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	3.34
Alpha value:	0.05
Critical value:	4.26
Conclusion:	Fail to reject the null hypothesis that all groups are equal

---

[a] The 32%, 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for growth effects.

APPENDIX 28

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	January 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A28-1
Test Organism:	
Scientific Name:	Pimephales promelas
Dry Weight:	0.82 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; growth
Water Quality:	Table A28-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival. The data are summarized in Table A28-2.

7-d Exposure:

The survival of fathead minnow larvae was not affected after 7 days of exposure to Canal Creek buffered groundwater (Table A28-3).

Growth:

Fathead minnow larval growth was not affected by 7 d of exposure to buffered Canal Creek groundwater (See Tables A28-3 and A28-4).

TABLE A28-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.1	7.7	8.0	8.1	8.0	7.0
Day 1						
0 H	8.4	8.5	8.4	8.2	7.9	7.5
24 H	7.9	8.0	7.9	7.9	7.9	7.9
Day 2						
0 H	8.8	8.5	8.4	8.2	8.2	7.5
24 H	7.2	7.2	7.2	7.2	7.1	7.0
Day 3						
0 H	8.6	8.5	8.3	8.1	7.9	7.7
24 H	7.9	7.1	7.2	7.2	7.1	7.2
Day 4						
0 H	8.5	8.4	8.2	8.2	8.0	7.8
24 H	7.7	7.0	7.3	7.1	7.0	7.1
Day 5						
0 H	8.4	8.4	8.3	8.3	8.1	7.9
24 H	7.6	7.1	7.4	7.0	7.1	7.2
Day 6						
0 H	8.5	8.4	8.6	8.5	8.3	8.1
24 H	6.5	6.0	6.1	6.1	6.2	6.5
Day 7						
24 H	7.7	7.3	7.4	7.5	7.4	7.3

TABLE A28-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.21	7.47	7.51	7.50	7.50	7.57
Day 1						
0 H	7.54	7.48	7.40	7.35	7.25	7.16
24 H	7.14	7.21	7.29	7.32	7.47	7.72
Day 2						
0 H	7.21	7.55	7.57	7.64	7.65	7.67
24 H	6.93	7.36	7.33	7.34	7.38	7.52
Day 3						
0 H	7.37	7.48	7.49	7.48	7.44	7.51
24 H	6.96	7.37	7.36	7.35	7.48	7.60
Day 4						
0 H	7.20	7.70	7.71	7.76	7.75	7.81
24 H	7.07	7.61	7.52	7.50	7.59	7.67
Day 5						
0 H	7.63	7.60	7.58	7.53	7.56	7.62
24 H	7.43	7.62	7.62	7.67	7.73	7.80
Day 6						
0 H	7.49	7.52	7.48	7.45	7.41	7.39
24 H	7.21	7.04	7.17	7.23	7.34	7.48
Day 7						
24 H	7.24	7.42	7.51	7.54	7.65	7.75

TABLE A28-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	110	500
Day 1		
0 H	110	500
Day 2		
0 H	100	490
Day 3		
0 H	110	500
Day 4		
0 H	110	490
Day 5		
0 H	110	500
Day 6		
0 H	100	500
Day 7		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A28-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	30	70
Day 1		
0 H	35	70
Day 2		
0 H	30	70
Day 3		
0 H	35	70
Day 4		
0 H	30	70
Day 5		
0 H	35	70
Day 6		
0 H	30	70
Day 7	[a]	[a]
24 H		

[a] Measurement not taken.

TABLE A28-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	44	70
Day 1		
0 H	40	72
Day 2		
0 H	44	70
Day 3		
0 H	44	72
Day 4		
0 H	40	70
Day 5		
0 H	44	72
Day 6		
0 H	40	72
Day 7	[a]	[a]
24 H		

[a] Measurement not taken.

TABLE A28-2. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
100	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100

TABLE A28-3. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.80	
	2	10	100	0.84	
	3	10	100	0.81	
	4	10	100	0.83	0.82
10	1	10	100	0.90	
	2	10	100	0.75	
	3	10	100	0.86	
	4	10	100	0.86	0.84
18	1	10	100	0.84	
	2	10	100	0.83	
	3	10	100	0.85	
	4	10	100	0.79	0.83
32	1	9	90	0.86	
	2	10	100	0.88	
	3	10	100	0.78	
	4	10	100	0.76	0.82
56	1	9	90	0.83	
	2	10	100	0.85	
	3	10	100	0.83	
	4	10	100	0.75	0.82
100	1	10	100	0.85	
	2	10	100	0.83	
	3	10	100	0.79	
	4	10	100	0.82	0.82

TABLE A28-4. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	5.02
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	6.41
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	0.16
Alpha value:	0.05
Critical Value:	2.77
Conclusion:	Fail to reject the null hypothesis that all groups are equal

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APPENDIX 29

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A29-1
Test Organism:	
Scientific Name:	*Pimephales promelas*
Dry Weight:	0.68 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to each renewal

Endpoints: Mortality; growth

Water Quality: Table A29-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 96-h exposure; 60% of the organisms exposed to 56% raw groundwater died during the 96-h exposure (Table A29-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 53.7% raw groundwater by volume (95% confidence limits = 50.30-57.69).

7-d Exposure:

Significant (α = 0.05) mortality occurred in fathead minnow larvae exposed to 100% and 56% groundwater by volume for 7 d (see Tables A29-3, A29-4, and A29-5). The 7-d LC50, which was determined by the moving average angle method, is as follows:

7-d LC50 = 44.2% raw groundwater by volume (95% confidence limits = 39.85-49.11).

The NOEC and LOEC for the larval fish, based on mortality are as follows:

NOEC = 32% raw groundwater by volume.
LOEC = 56% raw groundwater by volume.

Larval survival was not affected by exposure to APG-EA diluent water relative to UMD/WREC controls after 7 d of exposure (t-test: critical value = 3.71; t statistic = -0.65; α = 0.01).

Growth:

The growth of fathead minnow larvae was not affected by a 7-d exposure to concentrations ≤ 32% groundwater by volume (see Tables A29-3 and A29-6).

Laval growth was not affected by 7 d of exposure to APG diluent water relative to the UMD/WREC control fish (t-test: critical value = 3.71; t statistic = -1.11; α = 0.01).

TABLE A29-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.3	8.4	8.2	8.3	8.4	8.4	7.2
Day 1							
0 H	8.5	8.6	8.3	8.1	8.0	8.0	6.9
24 H	7.9	8.0	7.9	8.0	7.8	7.7	7.7
Day 2							
0 H	8.5	8.6	8.4	8.3	8.2	8.2	7.0
24 H	7.4	7.5	7.6	7.5	7.6	7.6	
Day 3							
0 H	8.4	8.7	8.2	8.3	8.1	8.1	6.9
24 H	7.2	7.0	7.1	7.2	7.3	7.7	
Day 4							
0 H	8.3	8.4	8.1	8.2	8.0	8.0	6.8
24 H	7.0	7.0	7.1	7.3	7.4	7.7	
Day 5							
0 H	8.2	8.3	8.0	8.1	8.1	8.1	6.7
24 H	7.0	7.0	6.9	7.1	7.3	7.2	
Day 6							
0 H	8.3	8.3	8.1	8.0	8.0	8.0	6.6
24 H	6.9	7.2	7.0	6.7	6.9	7.2	
Day 7							
24 H	7.0	7.1	6.9	6.9	7.0	7.0	

TABLE A29-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.15	7.29	6.99	6.69	6.48	5.89	3.74
Day 1							
0 H	7.20	7.40	7.01	6.70	6.55	5.96	3.75
24 H	7.02	7.19	7.42	7.41	7.30	6.99	4.50
Day 2							
0 H	6.95	7.09	6.68	6.58	6.34	6.05	3.80
24 H	7.07	6.96	7.06	7.08	7.06	7.01	
Day 3							
0 H	6.97	7.69	7.19	6.95	6.68	6.11	3.84
24 H	7.09	7.48	7.25	7.22	7.16	7.16	
Day 4							
0 H	6.99	7.38	7.12	6.89	6.76	6.49	3.91
24 H	6.87	7.34	7.19	7.05	6.95	6.95	
Day 5							
0 H	7.10	7.27	7.02	6.91	6.52	6.11	3.88
24 H	6.89	7.16	6.87	6.88	6.81	6.79	
Day 6							
0 H	7.05	7.35	7.06	6.88	6.49	5.99	3.79
24 H	7.31	7.19	7.30	7.31	7.20	7.10	
Day 7							
24 H	6.95	7.27	7.35	7.21	6.97	6.87	

TABLE A29-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	240	100	410
Day 1			
0 H	250	110	420
Day 2			
0 H	240	110	410
Day 3			
0 H	250	110	400
Day 4			
0 H	260	110	410
Day 5			
0 H	250	100	420
Day 6			
0 H	240	110	410
Day 7			
24 H	[a]	[a]	[a]

[a] Measurement not taken.

TABLE A29-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	35	[a]
Day 1			
0 H	60	30	
Day 2			
0 H	60	35	
Day 3			
0 H	65	30	
Day 4			
0 H	60	30	
Day 5			
0 H	60	35	
Day 6			
0 H	60	35	
Day 7			
24 H	[b]	[b]	

[a] Could not obtain measurement.
[b] Measurement not taken.

TABLE A29-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	68	80	100
Day 1			
0 H	60	70	110
Day 2			
0 H	60	70	114
Day 3			
0 H	64	70	110
Day 4			
0 H	68	70	104
Day 5			
0 H	68	84	100
Day 6			
0 H	68	80	110
Day 7			
24 H	[a]	[a]	[a]

[a] Measurement not taken.

TABLE A29-2. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	9	90
APG-EA Diluent Water	A	10	9	90
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	9	90
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	0	0
	B	10	5	50
	C	10	6	60
	D	10	5	50
100	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0

TABLE A29-3. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.64	
	2	10	100	0.67	
	3	10	100	0.72	
	4	9	90	0.69	0.68
APG-EA Diluent Water	1	9	90	0.68	
	2	10	100	0.64	
	3	9	90	0.62	
	4	10	100	0.68	0.66
10	1	10	100	0.72	
	2	9	90	0.68	
	3	10	100	0.69	
	4	10	100	0.66	0.69
18	1	10	100	0.73	
	2	10	100	0.60	
	3	10	100	0.62	
	4	9	90	0.66	0.65
32	1	10	100	0.62	
	2	9	90	0.68	
	3	10	100	0.63	
	4	9	90	0.60	0.63
56	1	0		0.00	
	2	2	20	0.47	
	3	1	10	0.11	
	4	2	20	0.35	0.23
100	1	0			
	2	0			
	3	0			
	4	0			

TABLE A29-4. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-Square Test for Normality:

Calculated test statistic:	3.83
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	1.56
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	81.87
Alpha value:	0.05
Critical value:	3.06
Conclusion:	Reject the null hypothesis that all groups are equal.

Dunnett's Test:

Calculated test statistic:	See Table A29-5
Alpha value:	0.05
Critical value:	2.36
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A29-5. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF DUNNETT'S TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Percent Mean Survival[a]	T Statistic	Significance
UMD/WREC Control	4	97.5		
10	4	97.5	0.000	
18	4	97.5	0.000	
32	4	95.0	0.577	
56	4	12.5	14.439	*

[a] Values given are actual percent survival means rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.36).

TABLE A29-6. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	3.32
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	2.39
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	1.77
Alpha value:	0.05
Critical value:	3.49
Conclusion:	Fail to reject the null hypothesis that all groups are equal

[a] The 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for growth effects.

APPENDIX 30

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-31, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A30-1
Test Organism:	
Scientific Name:	<u>Pimephales</u> <u>promelas</u>
Dry Weight:	0.68 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; growth
Water Quality:	Table A30-1

Results:

Mortality:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival. The data are summarized in Table A30-2.

7-d Exposure:

The survival of fathead minnow larvae was not affected after 7 days of exposure to Canal Creek buffered groundwater (Table A30-3).

Growth:

Fathead minnow larval growth was not affected by 7 d of exposure to buffered Canal Creek groundwater (See Tables A20-3 and A30-4).

TABLE A30-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.4	8.2	8.0	8.3	8.2	7.7
Day 1						
0 H	8.5	8.2	8.3	8.2	8.2	7.6
24 H	8.0	7.8	7.7	7.6	7.5	7.5
Day 2						
0 H	8.6	8.4	8.3	8.3	8.3	7.8
24 H	7.5	7.6	7.7	7.4	7.4	7.5
Day 3						
0 H	8.7	8.3	8.2	8.3	8.2	7.7
24 H	7.0	7.2	7.8	7.7	7.7	7.7
Day 4						
0 H	8.4	8.2	8.1	8.1	8.1	7.6
24 H	7.0	6.7	7.7	7.1	7.2	7.4
Day 5						
0 H	8.3	8.1	8.0	8.0	8.0	7.7
24 H	7.0	7.1	7.1	7.2	7.3	7.0
Day 6						
0 H	8.3	8.2	8.0	7.9	7.8	7.6
24 H	7.2	7.1	7.1	7.2	6.9	7.0
Day 7						
24 H	7.1	7.0	7.0	7.0	6.7	6.7

TABLE A30-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.29	7.63	7.69	7.72	7.81	7.84
Day 1						
0 H	7.40	7.35	7.33	7.31	7.30	7.29
24 H	7.19	7.81	7.77	7.85	7.97	7.99
Day 2						
0 H	7.09	7.22	7.28	7.32	7.36	7.39
24 H	6.96	7.08	7.20	7.28	7.30	7.46
Day 3						
0 H	7.69	7.34	7.43	7.42	7.55	7.20
24 H	7.48	7.06	7.21	7.42	7.56	7.65
Day 4						
0 H	7.38	7.40	7.42	7.47	7.52	7.55
24 H	7.34	6.78	6.94	7.04	7.31	7.43
Day 5						
0 H	7.27	7.31	7.39	7.41	7.42	7.49
24 H	7.16	6.85	6.92	7.01	7.14	7.31
Day 6						
0 H	7.35	7.37	7.37	7.38	7.40	7.49
24 H	7.19	7.30	7.41	7.51	7.50	7.51
Day 7						
24 H	7.27	7.29	7.32	7.37	7.55	7.63

TABLE A30-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	100	320
Day 1		
0 H	110	330
Day 2		
0 H	110	340
Day 3		
0 H	110	330
Day 4		
0 H	110	320
Day 5		
0 H	100	310
Day 6		
0 H	110	330
Day 7	[a]	[a]

[a] Measurement not taken.

TABLE A30-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	35	25
Day 1		
0 H	30	20
Day 2		
0 H	35	25
Day 3		
0 H	30	20
Day 4		
0 H	30	25
Day 5		
0 H	35	20
Day 6		
0 H	35	25
Day 7		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A30-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	80	70
Day 1		
0 H	70	78
Day 2		
0 H	70	70
Day 3		
0 H	70	70
Day 4		
0 H	70	70
Day 5		
0 H	84	74
Day 6		
0 H	80	70
Day 7		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A30-2. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	9	90
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
100	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100

TABLE A30-3. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.64	
	2	10	100	0.67	
	3	10	100	0.72	
	4	9	90	0.69	0.68
10	1	10	100	0.64	
	2	10	100	0.72	
	3	9	90	0.68	
	4	9	90	0.70	0.69
18	1	10	100	0.73	
	2	10	100	0.65	
	3	10	100	0.71	
	4	9	90	0.64	0.68
32	1	10	100	0.57	
	2	10	100	0.69	
	3	10	100	0.60	
	4	9	90	0.70	0.64
56	1	10	100	0.65	
	2	10	100	0.63	
	3	9	90	0.59	
	4	10	100	0.64	0.63
100	1	8	80	0.67	
	2	10	100	0.65	
	3	10	100	0.58	
	4	10	100	0.63	0.63

TABLE A30-4. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	6.31
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	2.88
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1.82
Alpha value:	0.05
Critical Value:	2.77
Conclusion:	Fail to reject the null hypothesis that all groups are equal

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APPENDIX 31

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-10, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A31-1
Test Organism:	
Scientific Name:	<u>Pimephales promelas</u>
Dry Weight:	0.67 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles

Aeration:	Prior to each renewal
Endpoints:	Mortality; growth
Water Quality:	Table A31-1

Results:

<u>Mortality</u>:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. All organisms exposed to 100% raw groundwater died during the 96-h exposure; 70% of the larvae exposed to 56% raw groundwater by volume died (Table A31-2). The 96-h LC50, which was determined by the moving average angle method, is:

96-h LC50 = 50.0% raw groundwater by volume (95% confidence limits = 45.36-55.60).

7-d Exposure:

Significant (α = 0.05) mortality occurred in fathead minnow larvae exposed to 100% and 56% groundwater by volume for 7 d (see Tables A31-3, A31-4, and A31-5). The 7-d LC50, which was determined by the moving average angle method, is:

7-d LC50 = 47.1% raw groundwater by volume (95% confidence limits = 42.75-52.18).

The NOEC and LOEC for the larval fish, based on mortality are as follows:

NOEC = 32% raw groundwater by volume.
LOEC = 56% raw groundwater by volume.

Larval survival was not affected by 7-d of exposure to APG-EA diluent water relative to UMD/WREC controls (t-test: critical value = 3.71; t statistic = 0.65; α = 0.01).

<u>Growth</u>:

An increase in dry weight was found in the fish exposed for 7 d to 10% groundwater by volume (see Tables A31-3, A31-6, and A31-7). No difference in growth was found in fish exposed to 18% and 32% groundwater by volume.

Larval growth was not affected by 7 d of exposure to APG-EA diluent water relative to UMD/WREC control fish (t-test: critical value = 3.71; t statistic = -0.57; α = 0.01).

TABLE A31-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 5) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	8.8	8.5	8.0	8.2	8.3	8.3	7.9
Day 1							
0 H	8.2	8.6	8.4	8.0	8.1	8.2	7.7
24 H	7.5	7.6	7.5	7.3	7.5	7.6	5.8
Day 2							
0 H	8.1	8.2	8.2	8.4	8.5	8.5	8.1
24 H	7.6	7.8	7.9	8.0	8.0	8.0	
Day 3							
0 H	8.6	8.6	8.6	8.6	8.6	8.6	8.0
24 H	7.7	7.7	7.8	7.9	7.9	7.9	
Day 4							
0 H	8.5	8.5	8.2	8.3	8.2	8.2	7.2
24 H	7.3	7.7	7.7	8.0	7.7	7.6	
Day 5							
0 H	8.3	8.6	8.3	8.1	8.1	8.1	7.7
24 H	7.5	7.6	7.6	7.5	7.5	7.6	
Day 6							
0 H	8.7	8.5	8.4	8.4	8.6	8.5	7.8
24 H	6.4	7.1	6.7	7.0	7.2	7.6	
Day 7							
24 H	6.9	7.2	6.9	7.1	7.2	7.4	

TABLE A31-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)						
	0 APG	0 WREC	10	18	32	56	100
Day 0							
0 H	7.28	7.38	7.16	7.05	6.81	6.40	3.76
Day 1							
0 H	7.28	7.53	7.07	6.82	6.66	6.30	3.78
24 H	7.41	7.28	7.44	7.47	7.45	7.29	5.80
Day 2							
0 H	7.40	7.33	7.31	7.02	6.85	6.41	3.79
24 H	7.50	7.67	7.58	7.47	7.35	7.24	
Day 3							
0 H	7.24	7.59	7.33	7.14	6.90	6.47	3.82
24 H	8.18	7.81	7.84	7.85	7.80	7.84	
Day 4							
0 H	7.20	7.45	7.25	7.10	6.87	6.43	3.85
24 H	7.25	7.71	7.77	7.76	7.67	7 59	
Day 5							
0 H	7.04	7.42	6.98	6.92	6.70	6.23	3.81
24 H	7.77	7.60	7.61	7.57	7.55	7 37	
Day 6							
0 H	7.13	7.22	7.06	6.85	6.63	6.22	3.79
24 H	7.21	7.85	7.50	7.36	7.29	7.19	
Day 7							
24 H	7.40	7.71	7.52	7.33	7.21	7.07	

TABLE A31-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	210	170	430
Day 1			
0 H	200	180	700
Day 2			
0 H	200	170	500
Day 3			
0 H	210	170	550
Day 4			
0 H	200	180	500
Day 5			
0 H	220	170	480
Day 6			
0 H	210	170	450
Day 7			
24 H	210	170	

TABLE A31-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	35	50	[a]
Day 1			
0 H	35	50	
Day 2			
0 H	35	55	
Day 3			
0 H	30	55	
Day 4			
0 H	35	50	
Day 5			
0 H	35	50	
Day 6			
0 H	35	50	
Day 7			
24 H	35	50	

[a] Could not obtain measurement.

TABLE A31-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)		
	0 APG	0 WREC	100
Day 0			
0 H	60	72	120
Day 1			
0 H	60	70	120
Day 2			
0 H	60	70	120
Day 3			
0 H	60	72	130
Day 4			
0 H	60	70	130
Day 5			
0 H	60	80	130
Day 6			
0 H	60	80	120
Day 7			
24 H	60	70	

TABLE A31-2. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
APG-EA Diluent Water	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	9	90
56	A	10	3	30
	B	10	6	60
	C	10	0	0
	D	10	3	30
100	A	10	0	0
	B	10	0	0
	C	10	0	0
	D	10	0	0

TABLE A31-3. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.66	
	2	10	100	0.68	
	3	9	90	0.67	
	4	9	90	0.68	0.67
APG-EA Diluent Water	1	10	100	0.61	
	2	10	100	0.62	
	3	10	100	0.72	
	4	9	90	0.68	0.66
10	1	10	100	0.68	
	2	10	100	0.74	
	3	9	90	0.74	
	4	10	100	0.69	0.71
18	1	10	100	0.64	
	2	10	100	0.66	
	3	10	100	0.68	
	4	10	100	0.69	0.67
32	1	10	100	0.64	
	2	10	100	0.61	
	3	9	90	0.65	
	4	9	90	0.63	0.63
56	1	3	30	0.26	
	2	5	50	0.30	
	3	0	0	0.00	
	4	1	10	0.25	0.20
100	1	0	0		
	2	0	0		
	3	0	0		
	4	0	0		

TABLE A31-4. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-Square Test for Normality:

Calculated test statistic:	3.66
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Test could not be performed because at least one treatment group has zero variance.

Steel's Many-One Rank Test:

Calculated test statistic:	See Table A31-5
Alpha value:	0.05
Critical value:	10.00
Conclusion:	Reject the null hypothesis that all groups are equal.

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[a] The 100% raw Canal Creek groundwater treatment was not included in the statistical analyses because all organisms died during the test.

TABLE A31- 5. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF STEEL'S MANY-ONE RANK TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc %(by Vol)	No. of Reps	Percent Mean Survival[a]	Rank Sum	Critical Value	Significance
UMD/WREC Control	4	95.0			
10	4	97.5	20.0	10.0	
18	4	100	22.0	10.0	
32	4	95.0	18.0	10.0	
56	4	22.5	10.0	10.0	*

[a] Values given are actual percent survival means rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05.

TABLE A31-6. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE[a]

Data Transformation:	
None	
Chi-square Test for Normality:	
Calculated test statistic:	3.84
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	3.12
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	8.54
Alpha value:	0.05
Critical value:	3.49
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A31-7
Alpha value:	0.05
Critical value:	2.29
Conclusion:	Reject the null hypothesis that all groups are equal

[a] The 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for growth effects.

TABLE A31-7. FATHEAD MINNOW CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON LARVAL SURVIVAL AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Dry Weight[a]	T Statistic	Significance
UMD/WREC Control	4	0.67		
10	4	0.71	-2.778	b
18	4	0.67	0.010	
32	4	0.63	2.269	

[a] Values given are actual dry weight means rather than arc sine square root transformed means which were used in the statistical analysis.

[b] Increase in dry weight (Dunnett's critical value = 2.29 at alpha = 0.05).

APPENDIX 32

FATHEAD MINNOW ACUTE AND 7-DAY SURVIVAL AND GROWTH TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-89/001 (Weber et al., 1989)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-10, 1995
Investigator:	S.D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	20% Perrier:80% RO water
Chemical Characteristics:	See Table A32-1
Test Organism:	
Scientific Name:	<u>Pimephales</u> <u>promelas</u>
Dry Weight:	0.67 mg (mean weight of controls at end of test)
Age at Start of Test:	<24 h
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	600 mL glass beaker
Test Solution Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	40
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; growth
Water Quality:	Table A32-1

Results:

<u>Mortality</u>:

96-h Exposure:

The data for the 96-h LC50 were obtained from the 7-d study. The buffered groundwater did not affect larval survival. The data are summarized in Table A32-2.

7-d Exposure:

The survival of fathead minnow larvae was not affected after 7 days of exposure to Canal Creek buffered groundwater (Table A32-3).

<u>Growth</u>:

Fathead minnow larval growth was not affected by 7 d of exposure to buffered Canal Creek groundwater (See Tables A32-3 and A32-4).

TABLE A32-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY TEST WATER QUALITY DATA FOR THE FATHEAD MINNOW 7-DAY TEST (TEST NO. 5) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.5	8.5	8.5	8.3	8.3	8.4
Day 1						
0 H	8.6	8.1	8.2	8.2	8.2	8.0
24 H	7.6	7.3	7.7	7.4	7.3	7.6
Day 2						
0 H	8.2	8.1	8.0	8.0	8.1	8.0
24 H	7.8	7.8	7.9	7.7	7.7	8.0
Day 3						
0 H	8.6	8.6	8.5	8.3	8.2	8.2
24 H	7.7	7.7	7.7	7.6	7.5	7.7
Day 4						
0 H	8.5	8.5	8.4	8.4	8.3	8.1
24 H	7.7	7.2	7.5	7.8	7.7	7.6
Day 5						
0 H	8.6	8.0	8.1	8.0	8.0	8.1
24 H	7.7	7.4	7.6	7.6	7.6	7.5
Day 6						
0 H	8.5	8.7	8.5	8.6	8.6	8.6
24 H	7.1	6.7	7.2	7.5	7.0	7.2
Day 7						
24 H	7.2	6.9	7.1	7.3	7.0	7.2

TABLE A32-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.38	7.30	7.34	7.40	7.40	7.21
Day 1						
0 H	7.53	7.38	7.45	7.46	7.47	7.26
24 H	7.28	7.38	7.46	7.50	7.56	7.62
Day 2						
0 H	7.33	7.38	7.35	7.31	7.30	7.30
24 H	7.67	7.39	7.48	7.53	7.60	7.67
Day 3						
0 H	7.59	7.50	7.56	7.59	7.58	7.46
24 H	7.81	8.00	8.01	8.07	8.09	8.10
Day 4						
0 H	7.45	7.49	7.41	7.37	7.27	7.21
24 H	7.71	7.27	7.25	7.39	7.41	7.43
Day 5						
0 H	7.42	7.34	7.43	7.45	7.47	7.20
24 H	7.60	7.40	7.40	7.61	7.80	7.37
Day 6						
0 H	7.22	7.23	7.29	7.36	7.40	7.38
24 H	7.85	7.09	7.34	7.39	7.41	7.53
Day 7						
24 H	7.71	7.21	7.45	7.50	7.53	7.55

TABLE A32-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	170	800
Day 1		
0 H	180	780
Day 2		
0 H	170	790
Day 3		
0 H	170	800
Day 4		
0 H	180	800
Day 5		
0 H	170	780
Day 6		
0 H	170	780
Day 7		
24 H	170	800

TABLE A32-1. (CONTINUED) - ALKALINITY (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	50	90
Day 1		
0 H	55	100
Day 2		
0 H	55	100
Day 3		
0 H	55	90
Day 4		
0 H	50	90
Day 5		
0 H	50	90
Day 6		
0 H	50	90
Day 7		
24 H	50	90

TABLE A32-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	72	70
Day 1		
0 H	70	70
Day 2		
0 H	70	70
Day 3		
0 H	72	70
Day 4		
0 H	70	70
Day 5		
0 H	80	80
Day 6		
0 H	80	70
Day 7		
24 H	80	80

TABLE A32-2. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% Groundwater by Volume)	Rep	Number Tested	No. Alive at 96 Hours	Percent Alive
UMD/WREC Control	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
10	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
18	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
32	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
56	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100
100	A	10	10	100
	B	10	10	100
	C	10	10	100
	D	10	10	100

TABLE A32-3. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - LARVAL SURVIVAL AND DRY WEIGHT AFTER 7 DAYS OF EXPOSURE

Conc (% by Vol)	Rep	Number Larvae Alive	Percent Survival	Dry Weight (mg)	Mean Dry Weight (mg)
UMD/WREC Control	1	10	100	0.66	
	2	10	100	0.68	
	3	9	90	0.67	
	4	9	90	0.68	0.67
10	1	10	100	0.70	
	2	10	100	0.61	
	3	9	90	0.68	
	4	10	100	0.62	0.65
18	1	10	100	0.58	
	2	10	100	0.72	
	3	10	100	0.56	
	4	10	100	0.62	0.62
32	1	10	100	0.60	
	2	10	100	0.68	
	3	10	100	0.55	
	4	10	100	0.64	0.62
56	1	10	100	0.64	
	2	10	100	0.57	
	3	10	100	0.55	
	4	10	100	0.63	0.60
100	1	9	90	0.67	
	2	10	100	0.55	
	3	10	100	0.55	
	4	10	100	0.65	0.60

TABLE A32-4. FATHEAD MINNOW CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - DRY WEIGHT OF LARVAE AFTER 7 DAYS OF EXPOSURE

Data Transformation:

None

Chi-square Test for Normality:

Calculated test statistic:	9.89
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	6.78
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1.23
Alpha value:	0.05
Critical Value:	2.77
Conclusion:	Fail to reject the null hypothesis that all groups are equal

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APPENDIX 33

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	October 11-15, 1994
Investigators:	R. S. Herriott and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A33-1
Test Organism:	
Scientific Name:	_Oryzias latipes_
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

Endpoint:	Mortality
Water Quality:	Table A33-1

Results:

100% Canal Creek raw groundwater killed 70% of the Japanese medaka fry in 96 h (Table A33-2). 56% Canal Creek groundwater killed 15% of the Japanese medaka fry in 96 h. No organisms died in any of the other treatments. The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 78.4% raw groundwater by volume (95% confidence limits = 66.67-102.31).

Japanese medaka survival was not affected by exposure to West Branch of Canal Creek water.

TABLE A33-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.5	8.3	8.1	8.1	7.9	6.6
Day 1						
0 H	9.2	8.7	8.4	7.8	8.7	6.5
24 H	8.8	8.9	8.9	8.9	8.8	8.5
Day 2						
0 H	9.8	9.0	8.6	8.2	7.2	4.6
24 H	8.7	8.7	8.7	8.6	8.6	8.4
Day 3						
0 H	8.7	8.1	8.1	7.5	6.8	4.5
24 H	8.1	7.9	8.0	8.1	8.0	8.0
Day 4						
24 H	8.3	7.6	7.4	7.2	6.6	4.3

TABLE A33-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.60	7.22	7.06	6.94	6.27	4.29
Day 1						
0 H	7.49	7.02	6.68	6.16	5.64	4.20
24 H	7.60	7.55	7.48	7.36	6.92	4.75
Day 2						
0 H	7.56	6.97	6.54	6.12	5.60	4.18
24 H	7.51	7.50	7.40	7.17	6.74	4.38
Day 3						
0 H	7.55	7.00	6.55	6.14	5.61	4.24
24 H	7.62	7.53	7.46	7.30	6.90	4.41
Day 4						
24 H	7.68	7.55	7.43	7.17	6.60	4.28

TABLE A33-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	41	7
Day 2		
0 H	41	7
Day 3		
0 H	41	7
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A33-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	86	86
Day 2		
0 H	103	86
Day 3		
0 H	86	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A33-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	195	518
Day 2		
0 H	197	515
Day 3		
0 H	200	510
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A33-2. JAPANESE MEDAKA CANAL CREEK RAW GROUNDWATER 96-H TOXICITY TEST (TEST NO. 1) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
West Branch Canal Creek Water	1	10	10	100
	2	10	10	100
10	1	10	10	100
	2	10	10	100
18	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	8	80
	2	10	9	90
100	1	10	4	40
	2	10	2	20

APPENDIX 34

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 1)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	October 11-15, 1994
Investigators:	R. S. Herriott and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A34-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

pH Buffer:	10 N NaOH
Endpoint:	Mortality
Water Quality:	Table A34-1

Results:

The survival of Japanese medaka fry was not affected after 4 days of exposure to Canal Creek buffered groundwater (Table A34-2).

TABLE A34-1. SUMMARY OF THE CANAL CREEEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 1) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	8.5	8.1	8.1	7.2
Day 1				
0 H	9.2	8.2	7.9	7.0
24 H	8.8	8.9	8.9	8.8
Day 2				
0 H	9.7	8.5	7.8	5.6
24 H	8.7	8.6	8.7	8.6
Day 3				
0 H	8.7	7.7	7.2	5.3
24 H	8.1	8.2	8.1	7.9
Day 4				
24 H	8.3	8.4	8.3	8.2

TABLE A34-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	7.60	7.00	7.52	7.64
Day 1				
0 H	7.49	7.40	7.39	7.33
24 H	7.60	7.85	7.95	8.05
Day 2				
0 H	7.56	7.15	7.12	7.01
24 H	7.51	7.67	7.80	7.93
Day 3				
0 H	7.55	7.01	7.04	6.96
24 H	7.62	7.58	7.71	7.85
Day 4				
24 H	7.68	7.61	7.72	7.78

TABLE A34-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	41	82
Day 2		
0 H	41	95
Day 3		
0 H	41	95
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A34-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	86	86
Day 2		
0 H	103	86
Day 3		
0 H	86	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A34-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	195	[a]
Day 2		
0 H	197	[a]
Day 3		
0 H	200	[a]
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A34-2. JAPANESE MEDAKA CANAL CREEK BUFFERED GROUNDWATER 96-H TOXICITY TEST (TEST NO. 1) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	10	100
100	1	10	10	100
	2	10	10	100

APPENDIX 35

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	December 12-16, 1994
Investigators:	R. S. Herriott and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A35-1
Test Organism:	
Scientific Name:	<u>Oryzias</u> <u>latipes</u>
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

Endpoint: Mortality

Water Quality: Table A35-1

Results:

All organisms exposed to 100% Canal Creek raw groundwater died during the 96-h exposure; 20% or less of the organisms died at the lower test concentrations (Table A35-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 63.1% raw groundwater by volume (95% confidence limits = 55.41-71.73).

All organisms exposed to APG-EA diluent water survived. Although 20% of the organisms exposed to West Branch of Canal Creek water died, exposure to West Branch creek water did not affect organism survival relative to the APG-EA diluent controls (t-test: critical value = 9.93; t statistic = -2.00; $\alpha = 0.01$).

TABLE A35-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	9.1	8.6	8.4	8.1	7.4	5.8
Day 1						
0 H	9.2	9.0	8.6	8.1	7.3	6.0
24 H	9.1	9.0	8.8	8.9	8.8	8.6
Day 2						
0 H	9.4	8.8	8.1	7.9	7.3	5.6
24 H	9.1	8.9	8.9	8.8	8.7	8.6
Day 3						
0 H	9.4	9.2	8.9	8.6	8.1	6.7
24 H	8.6	8.6	9.0	9.1	9.5	9.4
Day 4						
24 H	8.5	8.6	8.5	8.7	9.0	

TABLE A35-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.88	7.34	7.12	6.83	6.22	4.28
Day 1						
0 H	7.85	7.41	7.22	6.92	6.31	4.34
24 H	7.91	7.78	7.57	7.31	6.78	4.76
Day 2						
0 H	7.86	7.49	7.28	6.89	6.29	4.36
24 H	7.96	7.83	7.69	7.68	6.79	4.42
Day 3						
0 H	7.88	7.47	7.26	6.91	6.38	4.44
24 H	7.76	7.70	7.71	7.59	7.02	4.62
Day 4						
24 H	7.88	7.87	7.84	7.76	7.54	

TABLE A35-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	88	7
Day 1		
0 H	88	7
Day 2		
0 H	88	7
Day 3		
0 H	88	7
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A35-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	86
Day 1		
0 H	68	86
Day 2		
0 H	68	86
Day 3		
0 H	68	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A35-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	267	488
Day 2		
0 H	260	464
Day 3		
0 H	266	489
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A35-2. JAPANESE MEDAKA CANAL CREEK RAW GROUNDWATER 96-H TOXICITY TEST (TEST NO. 2) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
West Branch Canal Creek Water	1	10	8	80
	2	10	8	80
10	1	10	10	100
	2	10	10	100
18	1	10	9	90
	2	10	10	100
32	1	10	9	90
	2	10	10	100
56	1	10	8	80
	2	10	8	80
100	1	10	0	0
	2	10	0	0

APPENDIX 36

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	December 12-16, 1994
Investigators:	R. S. Herriott and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A36-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

pH Buffer:	10 N NaOH
Endpoint:	Mortality
Water Quality:	Table A36-1

Results:

The survival of Japanese medaka fry was not affected after 4 days of exposure to Canal Creek buffered groundwater (Table A36-2).

TABLE A36-1. SUMMARY OF THE CANAL CREEEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 2) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	9.1	8.2	7.2	5.4
Day 1				
0 H	9.2	8.2	7.5	6.1
24 H	9.1	8.8	8.8	8.5
Day 2				
0 H	9.4	8.0	7.1	5.4
24 H	9.1	8.7	8.6	8.4
Day 3				
0 H	9.4	8.5	8.5	7.4
24 H	8.6	8.0	8.4	8.6
Day 4				
24 H	8.5	8.7	8.7	8.6

TABLE A36-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	7.88	7.51	7.25	7.08
Day 1				
0 H	7.85	7.38	7.43	7.25
24 H	7.91	7.83	7.85	7.75
Day 2				
0 H	7.86	6.89	7.24	7.21
24 H	7.96	7.90	7.82	7.81
Day 3				
0 H	7.88	7.68	7.66	7.54
24 H	7.76	7.70	7.77	7.83
Day 4				
24 H	7.88	8.04	8.06	8.05

TABLE A36-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	88	109
Day 1		
0 H	88	116
Day 2		
0 H	88	109
Day 3		
0 H	88	102
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A36-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	86
Day 1		
0 H	68	86
Day 2		
0 H	68	86
Day 3		
0 H	68	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A36-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	[a]	[a]
Day 1		
0 H	267	645
Day 2		
0 H	260	609
Day 3		
0 H	266	622
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A36-2. JAPANESE MEDAKA CANAL CREEK BUFFERED GROUNDWATER 96-H TOXICITY TEST (TEST NO. 2) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
32	1	10	9	90
	2	10	10	100
56	1	10	10	100
	2	10	10	100
100	1	10	10	100
	2	10	10	100

APPENDIX 37

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	February 6-10, 1995
Investigators:	R. S. Herriott, S. D. Turley and D. W. Cooper
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A37-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

Endpoint: Mortality

Water Quality: Table A37-1

Results:

90% of the organisms exposed to 100% Canal Creek raw groundwater died during the 96-h exposure; 10% or less of the organisms died at the lower concentrations (Table A37-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 67.9% raw groundwater by volume (95% confidence limits = 60.89-78.06).

Japanese medaka survival was not affected by exposure to West Branch of Canal Creek water relative to APG-EA diluent water after 4 d of exposure.

TABLE A37-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	9.4	8.7	8.4	7.9	7.4	5.1
Day 1						
0 H	8.9	8.8	8.6	8.2	7.7	6.5
24 H	8.2	8.0	8.1	8.1	8.1	7.9
Day 2						
0 H	9.8	9.2	9.1	8.5	7.7	6.0
24 H	8.1	8.2	8.1	8.1	8.0	8.2
Day 3						
0 H	9.7	9.3	9.1	7.9	8.1	6.3
24 H	8.4	8.5	8.4	8.5	8.5	8.7
Day 4						
24 H	8.1	8.1	8.2	8.2	8.1	8.1

TABLE A37-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.69	7.24	7.03	6.72	6.16	4.37
Day 1						
0 H	7.82	7.65	7.51	7.22	6.86	4.45
24 H	7.86	7.68	7.73	7.63	7.43	5.03
Day 2						
0 H	7.48	7.25	6.99	6.56	5.78	4.41
24 H	7.91	7.99	7.93	7.82	7.68	4.56
Day 3						
0 H	7.81	7.35	7.11	6.74	6.15	4.47
24 H	7.74	7.72	7.70	7.62	7.46	4.65
Day 4						
24 H	7.75	7.69	7.62	7.50	7.35	4.47

TABLE A37-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	82	7
Day 1		
0 H	82	7
Day 2		
0 H	54	7
Day 3		
0 H	54	7
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A37-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	86	86
Day 1		
0 H	86	86
Day 2		
0 H	68	86
Day 3		
0 H	86	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A37-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	255	482
Day 1		
0 H	273	467
Day 2		
0 H	243	485
Day 3		
0 H	247	470
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A37-2. JAPANESE MEDAKA CANAL CREEK RAW GROUNDWATER 96-H TOXICITY TEST (TEST NO. 3) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
West Branch Canal Creek Water	1	10	10	100
	2	10	9	90
10	1	10	10	100
	2	10	10	100
18	1	10	10	100
	2	10	10	100
32	1	10	9	90
	2	10	9	90
56	1	10	10	100
	2	10	10	100
100	1	10	0	0
	2	10	2	20

APPENDIX 38

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 3)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	February 6-10, 1995
Investigators:	R. S. Herriott, S. D. Turley, and D. W. Cooper
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A38-1
Test Organism:	
Scientific Name:	Oryzias latipes
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

pH Buffer:	10 N NaOH
Endpoint:	Mortality
Water Quality:	Table A38-1

Results:

The survival of Japanese medaka fry was not affected after 4 days of exposure to Canal Creek buffered groundwater (Table A38-2).

TABLE A38-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 3) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	9.4	8.1	7.6	6.1
Day 1				
0 H	8.9	8.1	8.0	6.6
24 H	8.2	8.2	8.1	8.2
Day 2				
0 H	9.8	8.4	7.4	5.1
24 H	8.0	8.3	8.2	8.1
Day 3				
0 H	9.7	9.3	8.8	8.1
24 H	8.4	8.0	7.9	8.1
Day 4				
24 H	8.1	8.0	8.1	7.9

TABLE A38-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	7.69	7.39	7.30	7.13
Day 1				
0 H	7.82	7.80	7.59	7.03
24 H	7.86	7.31	7.92	8.08
Day 2				
0 H	7.48	7.18	7.27	7.23
24 H	7.91	7.93	7.48	7.94
Day 3				
0 H	7.81	7.40	7.40	7.31
24 H	7.74	7.75	7.83	8.00
Day 4				
24 H	7.75	7.68	7.75	7.88

TABLE A38-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	82	88
Day 1		
0 H	88	82
Day 2		
0 H	54	101
Day 3		
0 H	54	82
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A38-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	86	86
Day 1		
0 H	86	86
Day 2		
0 H	68	86
Day 3		
0 H	86	86
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A38-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	255	611
Day 1		
0 H	273	565
Day 2		
0 H	243	658
Day 3		
0 H	247	580
Day 4		
24 H	[a]	[a]

[a] Measurement not taken.

TABLE A38-2. JAPANESE MEDAKA CANAL CREEK BUFFERED GROUNDWATER 96-H TOXICITY TEST (TEST NO. 3) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	9	90
100	1	10	9	90
	2	10	10	100

APPENDIX 39

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	April 7-11, 1995
Investigators:	S. D. Turley and D. W. Cooper
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A39-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

Endpoint:	Mortality
Water Quality:	Table A39-1

Results:

All of the organisms exposed to 100% Canal Creek raw groundwater died during the 96-h exposure; 10% of the organisms died at the 56% Canal Creek raw groundwater by volume treatment (Table A39-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 62.8% raw groundwater by volume (95% confidence limits = 54.99-73.69).

Japanese medaka survival was not affected by exposure to West Branch of Canal Creek water relative to APG-EA diluent water after 4 d of exposure.

TABLE A39-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.9	8.2	8.6	8.2	8.0	6.1
Day 1						
0 H	9.1	8.6	8.2	7.4	7.0	6.2
24 H	7.7	7.8	7.8	7.7	7.7	7.7
Day 2						
0 H	9.1	8.2	8.2	7.9	7.5	6.5
24 H	8.1	8.0	8.1	7.9	8.0	7.3
Day 3						
0 H	8.3	8.2	7.8	7.6	7.3	6.9
24 H	7.8	7.7	7.8	7.8	7.8	7.8
Day 4						
24 H	7.8	7.8	7.6	7.9	7.9	7.7

TABLE A39-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.48	7.21	6.89	6.58	6.13	4.36
Day 1						
0 H	7.65	7.27	7.00	6.73	5.92	4.36
24 H	7.68	7.64	7.44	7.24	6.87	5.32
Day 2						
0 H	7.63	7.23	6.99	6.58	6.04	4.31
24 H	7.80	7.60	7.41	7.16	6.74	4.76
Day 3						
0 H	7.59	7.20	6.94	6.48	6.09	4.25
24 H	7.68	7.62	7.42	7.15	6.78	4.62
Day 4						
24 H	7.52	7.47	7.39	7.33	7.13	4.50

TABLE A39-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	41	[a]
Day 1		
0 H	41	
Day 2		
0 H	41	
Day 3		
0 H	34	
Day 4		
24 H	41	

[a] Could not obtain measurement using titration method because pH was <4.5.

TABLE A39-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	86	86
Day 1		
0 H	86	86
Day 2		
0 H	86	103
Day 3		
0 H	86	86
Day 4		
24 H	86	103

TABLE A39-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	237	473
Day 1		
0 H	197	450
Day 2		
0 H	215	471
Day 3		
0 H	207	303
Day 4		
24 H	251	435

TABLE A39-2. JAPANESE MEDAKA CANAL CREEK RAW GROUNDWATER 96-H TOXICITY TEST (TEST NO. 4)- PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
West Branch Canal Creek Water	1	10	10	100
	2	10	10	100
10	1	10	10	100
	2	10	10	100
18	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	9	90
100	1	10	0	0
	2	10	0	0

APPENDIX 40

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	April 7-11, 1995
Investigators:	S. D. Turley and D. W. Cooper
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A40-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

pH Buffer:	10 N NaOH
Endpoint:	Mortality
Water Quality:	Table A40-1

Results:

The survival of Japanese medaka fry was not affected after 4 days of exposure to Canal Creek buffered groundwater (Table A40-2).

TABLE A40-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 4) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	8.9	8.7	8.3	6.9
Day 1				
0 H	9.1	8.0	7.6	6.8
24 H	7.7	7.7	7.7	7.6
Day 2				
0 H	9.1	8.3	7.9	6.6
24 H	8.1	8.1	8.1	7.9
Day 3				
0 H	8.3	8.1	7.5	6.4
24 H	7.8	7.8	7.8	7.8
Day 4				
24 H	7.8	7.8	7.8	7.8

TABLE A40-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	7.48	6.75	7.26	7.01
Day 1				
0 H	7.65	7.39	7.44	6.95
24 H	7.68	7.56	7.74	7.80
Day 2				
0 H	7.63	7.39	7.40	6.96
24 H	7.80	7.48	7.60	7.70
Day 3				
0 H	7.59	7.35	7.36	7.03
24 H	7.68	7.46	7.68	7.75
Day 4				
24 H	7.52	7.63	7.66	7.74

TABLE A40-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	41	68
Day 1		
0 H	41	54
Day 2		
0 H	41	61
Day 3		
0 H	34	68
Day 4		
24 H	41	75

TABLE A40-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	86	103
Day 1		
0 H	86	86
Day 2		
0 H	86	103
Day 3		
0 H	86	86
Day 4		
24 H	86	86

TABLE A40-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	237	577
Day 1		
0 H	197	517
Day 2		
0 H	215	520
Day 3		
0 H	207	554
Day 4		
24 H	251	563

TABLE A40-2. JAPANESE MEDAKA CANAL CREEK BUFFERED GROUNDWATER 96-H TOXICITY TEST (TEST NO. 4) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	10	100
100	1	10	10	100
	2	10	10	100

APPENDIX 41

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	May 8-12, 1995
Investigators:	D. W. Cooper and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A41-1
Test Organism:	
Scientific Name:	Oryzias latipes
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

Endpoint: Mortality

Water Quality: Table A41-1

Results:

55% of the organisms exposed to 100% Canal Creek raw groundwater died during the 96-h exposure; 5% or less of the organisms died at the lower concentrations (Table A41-2). The 96-h LC50, which was determined by the moving average angle method, is as follows:

96-h LC50 = 93.9% raw groundwater by volume (95% confidence limits = 84.95-107.21).

Japanese medaka survival was not affected (t-test, $\alpha = 0.01$) by exposure to West Branch Canal of Creek water relative to APG-EA diluent water after 4 d of exposure.

TABLE A41-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 5)- DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	8.7	7.8	7.8	7.7	7.6	7.8
Day 1						
0 H	8.8	8.2	8.1	8.0	7.8	7.2
24 H	8.5	8.5	8.5	8.4	8.6	8.5
Day 2						
0 H	8.2	7.8	7.7	7.6	7.4	6.9
24 H	7.8	7.7	7.7	7.7	7.7	7.8
Day 3						
0 H	8.4	8.0	8.0	7.7	7.3	6.9
24 H	8.1	8.1	8.2	8.1	8.1	7.8
Day 4						
24 H	8.1	8.2	8.2	8.2	8.0	8.2

TABLE A41-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.57	7.42	7.19	6.80	6.05	4.17
Day 1						
0 H	7.55	7.22	7.02	6.67	5.94	4.28
24 H	7.57	7.58	7.37	7.07	6.72	4.88
Day 2						
0 H	7.56	7.19	6.93	6.49	5.98	4.26
24 H	7.59	7.54	7.31	7.08	6.74	4.49
Day 3						
0 H	7.57	7.20	6.94	6.74	6.02	4.26
24 H	7.61	7.56	7.41	7.15	6.80	4.46
Day 4						
24 H	7.27	7.29	7.26	7.19	6.93	4.34

TABLE A41-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	48	[a]
Day 1		
0 H	48	
Day 2		
0 H	48	
Day 3		
0 H	48	
Day 4		
24 H	48	

[a] Could not obtain measurement using titration method because pH was <4.5.

TABLE A41-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	103
Day 1		
0 H	68	103
Day 2		
0 H	86	120
Day 3		
0 H	86	103
Day 4		
24 H	86	103

TABLE A41-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	231	429
Day 1		
0 H	205	496
Day 2		
0 H	247	613
Day 3		
0 H	213	473
Day 4		
24 H	252	461

TABLE A41-2. JAPANESE MEDAKA CANAL CREEK RAW GROUNDWATER 96-H TOXICITY TEST (TEST NO. 5) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume)	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
West Branch Canal Creek Water	1	10	9	90
	2	10	10	100
10	1	10	10	100
	2	10	10	100
18	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	9	90
100	1	10	5	50
	2	10	4	40

APPENDIX 42

JAPANESE MEDAKA 96-H ACUTE TEST CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	EPA/600/4-90/027 (Weber, 1991)
Type of Test:	Static renewal (every 24 h)
Date:	May 8-12, 1995
Investigators:	D. W. Cooper and S. D. Turley
Laboratory:	APG biomonitoring facility
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Dilution Water:	
Source:	APG dechlorinated tap water
Chemical Characteristics:	See Table A42-1
Test Organism:	
Scientific Name:	*Oryzias latipes*
Age at Start of Test:	6 days old
Source:	Ft. Detrick BRDL culture
Experimental Chambers:	
Material:	Glass beakers
Size:	600 mL
Volume:	400 mL
No. Organisms/Replicate:	10
No. Organisms/Treatment:	20
Loading:	<0.5 g/L
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	None

pH Buffer:	10 N NaOH
Endpoint:	Mortality
Water Quality:	Table A42-1

Results:

The survival of Japanese medaka fry was not affected after 4 days of exposure to Canal Creek buffered groundwater (Table A42-2).

TABLE A42-1. SUMMARY OF THE CANAL CREEEK BUFFERED GROUNDWATER BIOASSAY WATER QUALITY DATA FOR THE JAPANESE MEDAKA 96-H TEST (TEST NO. 5) - DISSOLVED OXYGEN (MG/L)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	8.7	8.0	7.8	7.7
Day 1				
0 H	8.8	8.4	8.3	8.2
24 H	8.5	8.6	8.6	8.5
Day 2				
0 H	8.2	7.7	7.5	7.5
24 H	7.8	7.7	7.7	7.7
Day 3				
0 H	8.4	7.6	7.3	7.2
24 H	8.1	7.6	7.7	7.7
Day 4				
24 H	8.1	8.2	8.2	8.1

TABLE A42-1. (CONTINUED) - pH (STANDARD UNITS)

	Test Concentrations (Percent Groundwater by Volume)			
	0	32	56	100
Day 0				
0 H	7.57	7.14	7.22	7.02
Day 1				
0 H	7.55	7.51	7.49	6.99
24 H	7.57	7.71	7.78	7.83
Day 2				
0 H	7.56	7.39	7.43	6.97
24 H	7.59	7.71	7.71	7.77
Day 3				
0 H	7.57	7.41	7.40	6.95
24 H	7.61	7.61	7.68	7.74
Day 4				
24 H	7.27	7.68	7.69	7.67

TABLE A42-1. (CONTINUED) - ALKALINITY (MG/L as $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	48	75
Day 1		
0 H	48	75
Day 2		
0 H	48	68
Day 3		
0 H	48	75
Day 4		
24 H	48	75

TABLE A42-1. (CONTINUED) - HARDNESS (MG/L AS $CaCO_3$)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	68	103
Day 1		
0 H	68	103
Day 2		
0 H	86	120
Day 3		
0 H	86	103
Day 4		
24 H	86	103

TABLE A42-1. (CONTINUED) - CONDUCTIVITY (μMHOS/CM)

	Test Concentrations (Percent Groundwater by Volume)	
	0	100
Day 0		
0 H	231	531
Day 1		
0 H	205	525
Day 2		
0 H	247	565
Day 3		
0 H	213	547
Day 4		
24 H	252	562

TABLE A42-2. JAPANESE MEDAKA CANAL CREEK BUFFERED GROUNDWATER 96-H TOXICITY TEST (TEST NO. 5) - PERCENT FRY SURVIVAL AFTER 96 HOURS OF EXPOSURE

Concentration (% by Volume	Rep	Number Tested	No. Alive at End of Test	Percent Alive
APG-EA Diluent Water	1	10	10	100
	2	10	10	100
32	1	10	10	100
	2	10	10	100
56	1	10	10	100
	2	10	10	100
100	1	10	9	90
	2	10	10	100

APPENDIX 43

LIST OF DATA REPORTS FOR THE AMES ASSAYS CONDUCTED ON CANAL CREEK GROUNDWATER (CC-27B), WEST BRANCH OF CANAL CREEK WATER, AND APG-EA TAP WATER

TABLE A43-1. LIST OF DATA REPORTS FOR THE AMES ASSAYS CONDUCTED ON CANAL CREEK GROUNDWATER (CC-27B), WEST BRANCH OF CANAL CREEK WATER, AND APG-EA TAP WATER

<u>Sample taken September 12, 1994</u>:

San, R.H.C. and D.L. Pugh. 1994. <u>Salmonella</u> plate incorporation mutagenicity assay using neat and extracted water samples. Laboratory Study Nos. G94BH12.501005, G94BH13.501005, and G94BH13.501005. Microbiological Assoc., Inc., Rockville, MD.

<u>Sample taken November 7, 1994</u>:

San, R.H.C. and D.L. Pugh. 1995. <u>Salmonella</u> plate incorporation mutagenicity assay using neat and extracted water samples. Laboratory Study Nos. G94BP00.501005 and G94BP05.501005. Microbiological Assoc., Inc., Rockville, MD.

<u>Sample taken January 23, 1995</u>:

Wagner, V.O. and D.L. Pugh. 1995. <u>Salmonella</u> plate incorporation mutagenicity assay using neat and extracted water samples. Laboratory Study Nos. G95AC58.501005 and G95AC59.501005. Microbiological Assoc., Inc., Rockville, MD.

<u>Sample taken March 23, 1995</u>:

Wagner, V.O. and D.L. Pugh. 1995. <u>Salmonella</u> plate incorporation mutagenicity assay using neat and extracted water samples. Laboratory Study Nos. G95AM13.501005 and G95AM14.501005. Microbiological Assoc., Inc., Rockville, MD.

<u>Sample taken June 7, 1995</u>:

Wagner, V.O. 1995. <u>Salmonella</u> plate incorporation mutagenicity assay using extracted water samples. Laboratory Study Nos. G95AR09.501005, G95AR10.501005, and G95AR11.501005. Microbiological Assoc., Inc., Rockville, MD.

APPENDIX 44

FROG EMBRYO TERATOGENESIS ASSAY - _Xenopus_ (FETAX)
CONDUCTED ON CANAL CREEK RAW (pH ≈4)
GROUNDWATER (WELL CC-27B)
(TEST NO. 1)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	September 16-20, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A44-1
Test Organism:	
Scientific Name:	_Xenopus laevis_
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	20
No. Organisms/Treatment:	Control: 40 Groundwater: 40
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

Endpoints:	Mortality; malformation
Test Temperature:	24 ± 0.2°C

Results:

<u>Mortality</u>:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek raw groundwater; thus, an LC50 could not be calculated (Table A44-2). A significant increase in embryo mortality occurred at 100% raw groundwater by volume (see Tables A44-2, A44-3 and A44-4).

Embryos survival was not affected by 4 d of exposure to APG-EA tap water relative to the UMD/WREC controls.

<u>Malformations</u>:

Significant ($\alpha = 0.05$) embryo malformations occurred (see Tables A44-2, A44-5, and A44-6). Less than 50% malformation occurred at all test concentrations, thus, an EC50 could not be calculated (Table A44-2). The NOEC and LOEC for the embryos, based on increased numbers of malformations, are as follows:

NOEC = 18% raw groundwater by volume.
LOEC = 32% raw groundwater by volume.

No difference in normal embryo development occurred between the embryos exposed to APG-EA tap water relative to the UMD/WREC controls.

The types of malformed embryos are given in Table A44-7.

TABLE A44-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 1)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.74	7.46	7.23	6.90	6.22	3.96
Day 1						
0 H	7.64	7.31	7.11	6.59	6.10	3.99
Day 2						
0 H	7.60	7.24	7.07	6.54	6.00	3.95
Day 3						
0 H	7.65	7.28	7.09	6.39	5.99	3.98
Day 4						
24 H	7.74	7.43	7.25	6.73	6.24	4.14

TABLE A44-2. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC Control	1	20	100	1	5.0
	2	20	100	2	10.0
APG-EA Diluent Water	1	20	100	1	5.0
	2	18	90	1	5.6
10	1	18	90	3	16.7
	2	20	100	2	10.0
18	1	19	95	3	15.8
	2	19	95	3	15.8
32	1	19	95	5	26.3
	2	20	100	5	25.0
56	1	19	95	6	31.6
	2	19	95	5	26.3
100	1	12	60	6	50.0
	2	18	90	8	44.4

TABLE A44-3. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

None

Fisher's Exact Test:

Calculated test statistic:	See Table A44-4
Alpha value:	0.05
Critical value:	35
Conclusion:	Reject the null hypothesis that all groups are equal.

TABLE A44-4. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF FISHER'S TEST ON EMBRYO MORTALITY AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Number Alive	Number Dead	b Value	Significance
UMD/WREC Control	40	0	40	
10	38	2	38	
18	38	2	38	
32	39	1	39	
56	38	2	38	
100	30	10	30	*

* Significantly different at alpha = 0.05 (Fisher's critical value = 35).

TABLE A44-5. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	10.66
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	2.71
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	12.38
Alpha value:	0.05
Critical value:	5.19
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A44-5
Alpha value:	0.05
Critical value:	2.85
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A44-6. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	92.5		
10	2	86.8	2.02	
18	2	84.2	2.78	
32	2	74.4	5.31	*
56	2	71.1	6.07	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.85).

TABLE A44-7. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe												
Gut, coiling		2	2		1	3	2	1	2		3	1
Edema:												
Multiple	1		1	1			2	2				3
Cardiac										1		
Abdominal												1
Facial												
Cephalic												
Blisters												
Tail												
Notochord				1					1		2	
Fin												
Face					2		1	2	3	4	1	3
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 45

FROG EMBRYO TERATOGENESIS ASSAY - *Xenopus* (FETAX)
CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7)
GROUNDWATER (WELL CC-27B)
(TEST NO. 1)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	September 16-20, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A45-1
Test Organism:	
Scientific Name:	*Xenopus laevis*
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	20
No. Organisms/Treatment:	Groundwater: 40 Control: 40
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; malformations
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Buffered Canal Creek groundwater did not affect embryo survival. The data are summarized in Tables A45-2 and A45-3.

Malformations:

The incidence of frog embryo malformations was not affected after 96 h of exposure to buffered Canal Creek groundwater (Tables A45-2 and A45-4).

The types of malformed embryos are given in Table A45-5.

TABLE A45-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 1)

	Test Concentrations (Percent Groundwater by Volume)				
	0	18	32	56	100
Day 0					
0 H	7.64	7.25	7.20	7.17	7.05
Day 1					
0 H	7.59	7.22	7.11	7.07	7.01
Day 2					
0 H	7.59	7.26	7.22	7.10	7.00
Day 3					
0 H	7.70	7.32	7.23	7.15	6.99
Day 4					
24 H	7.67	7.23	7.15	7.06	6.97

TABLE A45-2. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	20	100	1	5.0
Control	2	20	100	2	10.0
10	1	19	95	1	5.3
	2	17	85	3	17.6
18	1	16	80	2	12.5
	2	18	90	1	5.6
32	1	19	95	4	21.1
	2	18	90	1	5.6
56	1	17	85	2	11.8
	2	17	85	2	11.8
'100	1	19	95	3	15.8
	2	18	90	3	16.7

TABLE A45-3. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	4.34
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	3.94
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

TABLE A45-4. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 1) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	3.78
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	0.37
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

---

TABLE A45-5. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 1) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe												
Gut, coiling		2	1	1		1		1	1	1	3	2
Edema:												
Multiple	1			2	1		3		1	1		1
Cardiac												
Abdominal												
Facial												
Cephalic												
Blisters												
Tail												
Notochord					1		1					
Fin												
Face												
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 46

FROG EMBRYO TERATOGENESIS ASSAY - _Xenopus_ (FETAX) CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 2)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	November 11-15, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A46-1
Test Organism:	
Scientific Name:	_Xenopus laevis_
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Control: 50 Groundwater: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

Endpoints: Mortality; malformation

Test Temperature: 24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek raw groundwater; thus, an LC50 could not be calculated (Table A46-2). A significant increase in embryo mortality occurred at 100% raw groundwater by volume (see Tables A46-2, A46-3 and A46-4).

No difference in mortality occurred between embryos held in APG-EA diluent water and UMD/WREC water.

Malformations:

Significant ($\alpha = 0.05$) embryo malformations occurred (see Tables A46-2, A46-5, and A46-6). The NOEC and LOEC for the embryos, based on increased numbers of malformations, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

The 96-h EC50 for malformations of the embryos, determined by the moving average angle method, is as follows:

96-h EC50 = 90.3 (95% confidence limits = 69.52-183.56)

Normal embryo development was not affected by exposure to APG-EA tap water relative to the UMD/WREC controls.

The types of malformed embryos are given in Table A46-7.

TABLE A46-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 2)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.77	7.35	7.20	6.87	6.09	3.85
Day 1						
0 H	7.70	7.29	7.08	6.68	6.14	3.79
Day 2						
0 H	7.65	7.28	7.12	6.62	6.00	3.69
Day 3						
0 H	7.67	7.31	7.14	6.45	6.03	3.88
Day 4						
24 H	7.79	7.53	7.33	6.77	6.19	3.99

TABLE A46-2. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC Control	1	24	96	2	8.3
	2	23	92	2	8.7
APG-EA Diluent Water	1	24	96	2	8.3
	2	23	92	2	8.7
10	1	23	92	4	17.4
	2	22	88	2	9.1
18	1	24	96	4	16.7
	2	23	92	4	17.4
32	1	21	84	4	19.0
	2	22	88	5	22.7
56	1	22	88	6	27.3
	2	24	96	6	25.0
100	1	21	84	10	47.6
	2	20	80	12	60.0

TABLE A46-3. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc-sine square-root transformation

Chi-Square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed.

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	1.22
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	3.08
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A46-4
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal (see Table A12-4)

TABLE A46-4. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF DUNNETT'S TEST ON EMBRYO MORTALITY AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Percent Survival	T Statistic	Significance
UMD/WREC Control	2	94		
10	2	90	1.20	
18	2	94	0.00	
32	2	86	2.18	
56	2	92	0.53	
100	2	82	3.05	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A46-5. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	10.66
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	6.36
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	9.57
Alpha value:	0.05
Critical value:	5.19
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A46-6
Alpha value:	0.05
Critical value:	2.85
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A46-6. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	91.5		
10	2	86.7	1.71	
18	2	83.0	3.05	*
32	2	79.1	4.20	*
56	2	73.9	5.65	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.85).

TABLE A46-7. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe												
Gut, coiling	1		2	2	1		3	1	4			2
Edema:												
Multiple		1			1	2		1		5	3	5
Cardiac												
Abdominal												
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1	1	1		2	1	1	2	1		2	4
Fin											1	
Face			1					1	1		4	1
Eye												
Brain												
Hemorrhage												
Cardiac						1				1		
Other												

APPENDIX 47

FROG EMBRYO TERATOGENESIS ASSAY - *Xenopus* (FETAX)
CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7)
GROUNDWATER (WELL CC-27B)
(TEST NO. 2)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	November 11-15, 1994
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A47-1
Test Organism:	
Scientific Name:	*Xenopus laevis*
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Groundwater: 50 Control: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; malformations
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek buffered groundwater; thus, an LC50 could not be calculated (Table A47-2). Significant embryo mortality occurred at 100% buffered Canal Creek groundwater by volume (see Tables A47-2, A47-3 and A47-4).

Malformations:

The incidence of frog embryo malformations was not affected after 96 h of exposure to buffered Canal Creek groundwater (see Tables A47-2 and A47-5).

The types of malformed embryos are given in Table A47-6.

TABLE A47-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 2)

	Test Concentrations (Percent Groundwater by Volume)				
	0	18	32	56	100
Day 0					
0 H	7.74	7.45	7.32	7.22	7.11
Day 1					
0 H	7.65	7.40	7.25	7.16	7.08
Day 2					
0 H	7.68	7.44	7.33	7.20	7.14
Day 3					
0 H	7.74	7.46	7.37	7.24	7.12
Day 4					
24 H	7.77	7.37	7.26	7.16	7.01

TABLE A47-2. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	24	96	2	8.3
Control	2	23	92	2	8.7
10	1	22	88	2	9.1
	2	24	96	2	8.3
18	1	24	96	4	16.7
	2	23	92	2	8.7
32	1	21	84	2	9.5
	2	20	80	4	20.0
56	1	22	88	3	13.6
	2	23	92	2	8.7
100	1	16	64	3	18.8
	2	20	80	4	20.0

TABLE A47-3. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	5.49
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	5.49
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated Test Statistic:	See Table A47-4
Alpha Value:	0.05
Critical Value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A47-4. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - RESULTS OF DUNNETT'S TEST ON EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Conc %(by Vol)	No. of Reps	Mean Percent Survival[a]	T Statistic	Significance
UMD/WREC Control	2	94.0		
10	2	92.0	0.23	
18	2	94.0	0.00	
32	2	82.0	1.32	
56	2	90.0	0.52	
100	2	70.0	4.29	*

[a] Values given are actual percent mean surviving embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A47-5. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 2) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	10.66
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	5.57
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	0.72
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

TABLE A47-6. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 2) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe												
Gut, coiling	1		2		1	1	2	3	2		2	3
Edema:												
Multiple		1			2	1		1		1		
Cardiac												
Abdominal											1	
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1	1		2	1				1	1		
Fin												
Face												1
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 48

FROG EMBRYO TERATOGENESIS ASSAY - *Xenopus* (FETAX)
CONDUCTED ON CANAL CREEK RAW (pH ≈4)
GROUNDWATER (WELL CC-27B)
(TEST NO. 3)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	January 25-29, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A48-1
Test Organism:	
Scientific Name:	*Xenopus laevis*
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Control: 50 Groundwater: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

Endpoints:	Mortality; malformation
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek raw groundwater; thus, an LC50 could not be calculated (Table A48-2). Significant embryo mortality occurred at 100% raw groundwater by volume (See Tables A48-2, A48-3 and A48-4).

Embryo survival was not affected by exposure to APG-EA diluent water relative to the UMD/WREC control embryos after 4 d of exposure.

Malformations:

Significant ($\alpha = 0.05$) embryo malformations occurred (see Tables A48-2, A48-5, and A48-6). The NOEC and LOEC for the embryos, based on increased numbers of malformations, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Less than 50% of the embryos were malformed after exposure for 4 days to 100% Canal Creek raw groundwater; thus an EC50 could not be calculated (Table A48-6)

Normal embryo development was not significantly affected by exposure to APG-EA tap water relative to the UMD/WREC controls.

The types of malformed embryos are given in Table A48-7.

TABLE A48-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 3)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.55	7.11	6.67	6.27	5.67	3.74
Day 1						
0 H	7.32	6.89	6.66	6.26	5.23	3.79
Day 2						
0 H	7.39	7.12	6.80	6.35	5.47	3.71
Day 3						
0 H	7.35	6.86	6.81	6.65	5.99	3.79
Day 4						
24 H	7.43	7.46	7.43	7.20	6.49	4.05

TABLE A48-2. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC Control	1	25	100	2	8.0
	2	24	96	1	4.2
APG-EA Diluent Water	1	25	100	2	8.0
	2	24	96	1	4.2
10	1	24	96	2	8.3
	2	25	100	2	8.0
18	1	24	96	4	16.7
	2	25	100	5	20.0
32	1	25	100	7	28.0
	2	24	96	7	29.2
56	1	23	92	7	30.4
	2	19	76	5	26.3
100	1	21	84	8	38.1
	2	17	68	7	41.2

TABLE A48-3. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc-sine square-root

Chi-Square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed.

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	1.10
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	4.79
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A48-4
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A48-4. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF DUNNETT'S TEST ON EMBRYO MORTALITY AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Percent Survival	T Statistic	Significance
UMD/WREC Control	2	98		
10	2	98	0.00	
18	2	98	0.00	
32	2	98	0.00	
56	2	84	2.41	
100	2	76	3.45	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A48-5. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	10.66
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	4.13
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	41.85
Alpha value:	0.05
Critical value:	5.19
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A48-6
Alpha value:	0.05
Critical value:	2.85
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A48-6. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	93.9		
10	2	91.8	1.32	
18	2	81.6	6.03	*
32	2	71.4	9.78	*
56	2	71.4	9.69	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.85).

TABLE A48-7. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe							2	1		1	3	
Gut, coiling			1		1	1	3	2	2	1	2	2
Edema:												
Multiple	1	1	1	1	1			2	2	3	1	1
Cardiac						1						
Abdominal							1					
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1			1	2	3			1		2	2
Fin												
Face								2	1			2
Eye							1		1			
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 49

FROG EMBRYO TERATOGENESIS ASSAY - Xenopus (FETAX)
CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7)
GROUNDWATER (WELL CC-27B)
(TEST NO. 3)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	January 25-29, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A49-1
Test Organism:	
Scientific Name:	Xenopus laevis
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Groundwater: 50 Control: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; malformations
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek buffered groundwater; thus, an LC50 could not be calculated (Table A49-2). Embryo survival was not affected by exposure for 4 days to Canal Creek buffered groundwater (See Tables A49-2 and A49-3).

Malformations:

A significant ($\alpha = 0.05$) increase in the incidence of frog embryo malformations occurred after 96 h of exposure at all concentrations down to 32% buffered Canal Creek groundwater (See Tables A49-2, A49-3 and A49-5). Less than 50% malformation occurred at all test concentrations, thus, an EC50 could not be calculated (Table A49-2). The NOEC and LOEC for the embryos, based on increased number of malformations, are as follows:

NOEC = 18% buffered groundwater by volume
LOEC = 32% buffered groundwater by volume

The types of malformed embryos are given in Table A49-6.

TABLE A49-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 3)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.55	7.48	7.40	7.35	7.25	7.16
Day 1						
0 H	7.32	7.55	7.57	7.64	7.65	7.67
Day 2						
0 H	7.39	7.48	7.49	7.48	7.44	7.51
Day 3						
0 H	7.35	7.70	7.71	7.76	7.75	7.81
Day 4						
24 H	7.43	7.62	7.62	7.67	7.73	7.77

TABLE A49-2. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	25	100	2	8.0
Control	2	24	96	1	4.2
10	1	24	96	2	8.3
	2	23	92	2	8.7
18	1	23	92	2	8.7
	2	24	96	2	8.3
32	1	24	96	4	16.7
	2	25	100	5	20.0
56	1	22	88	7	31.8
	2	23	92	5	21.7
100	1	24	96	6	25.0
	2	23	92	7	30.4

TABLE A49-3. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	0.16
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	2.17
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

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TABLE A49-4. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	5.90
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	17.31
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A49-5
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A49-5 FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 3) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	93.9		
10	2	91.5	1.08	
18	2	91.5	1.08	
32	2	81.6	4.28	*
56	2	73.3	6.45	*
100	2	72.3	6.71	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A49-6. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 3) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe							1	2		1	1	
Gut, coiling			1			1	2	2	4	2	3	5
Edema:												
Multiple	1	1	1	1	2	1	1	1	2	2	2	2
Cardiac												
Abdominal												
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1			1					1			
Fin												
Face												
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 50

FROG EMBRYO TERATOGENESIS ASSAY - Xenopus (FETAX) CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 4)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A50-1
Test Organism:	
Scientific Name:	Xenopus laevis
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Control: 50 Groundwater: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

Endpoints:	Mortality; malformation
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek raw groundwater; thus, an LC50 could not be calculated (Table A50-2). Significant embryo mortality occurred at the 56% and 100% raw groundwater by volume treatments. (See Tables A50-2, A50-3 and A50-4).

Embryo survival was not affected by exposure to APG-EA tap water relative to the UMD/WREC control embryos after 4 d of exposure.

Malformations:

Significant ($\alpha = 0.05$) embryo malformations occurred (see Tables A50-2, A50-5, and A50-6). The NOEC and LOEC for the embryos, based on increased numbers of malformations, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

The 96-h EC50 for malformations of the embryos, determined by the moving average angle method, is as follows:

96-h EC50 = 77.9 (95% confidence limits = 53.05-6698.20)

Normal embryo development was not affected by exposure to APG-EA tap water relative to the UMD/WREC control embryos.

The types of malformed embryos are given in Table A50-7.

TABLE A50-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 4)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.60	7.25	7.00	6.68	6.04	3.74
Day 1						
0 H	7.65	7.29	7.06	6.73	6.07	3.75
Day 2						
0 H	7.61	7.23	7.02	6.69	6.01	3.80
Day 3						
0 H	7.60	7.20	7.00	6.71	5.99	3.84
Day 4						
24 H	7.69	7.27	7.11	6.80	6.12	4.07

TABLE A50-2. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC Control	1	25	100	2	8.0
	2	24	96	1	4.2
APG-EA Diluent	1	25	100	2	8.0
	2	24	96	2	8.3
10	1	23	92	4	17.4
	2	24	96	2	8.3
18	1	23	92	6	26.1
	2	24	96	6	25.0
32	1	21	84	7	33.3
	2	23	92	8	34.8
56	1	19	76	9	47.4
	2	20	80	6	30.0
100	1	20	80	11	55.0
	2	16	64	9	56.3

TABLE A50-3. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc-sine square-root	
Chi-Square Test for Normality:	
Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed.
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	1.29
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	7.78
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A50-4
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A50-4. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF DUNNETT'S TEST ON EMBRYO MORTALITY AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Percent Survival	T Statistic	Significance
UMD/WREC Control	2	98		
10	2	94	1.18	
18	2	94	1.18	
32	2	88	2.51	
56	2	78	4.26	*
100	2	72	5.09	*

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A50-5. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE[a]

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	8.53
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	4.15
Alpha value:	0.01
Critical value:	11.34
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	17.52
Alpha value:	0.05
Critical value:	6.59
Conclusion:	Reject the null hypothesis that all groups are equal

Bonferroni t-Test:

Calculated test statistic:	See Table A50-6
Alpha value:	0.05
Critical value:	3.19
Conclusion:	Reject the null hypothesis that all groups are equal

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[a] The 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for malformation effects.

TABLE A50-6. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF BONFERRONI T-TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	93.9		
10	2	87.2	2.02	
18	2	74.5	4.98	*
32	2	65.9	6.61	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Bonferroni's critical value = 3.19).

TABLE A50-7. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe						1	2	1	1		2	2
Gut, coiling			1		3	1	2	2	3	1	3	2
Edema:												
Multiple	1		3	1	3		3	3	2	3	4	5
Cardiac	1			1		2				1		
Abdominal						2			2			
Facial												
Cephalic												
Blisters												
Tail												
Notochord		1							1		1	
Fin												
Face								1		1	1	
Eye												
Brain								1				
Hemorrhage												
Cardiac												
Other												

APPENDIX 51

FROG EMBRYO TERATOGENESIS ASSAY - _Xenopus_ (FETAX)
CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7)
GROUNDWATER (WELL CC-27B)
(TEST NO. 4)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	March 24-28, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source: Chemical Characteristics:	APG-EA Canal Creek Well CC-27B See Appendix 58
Test Medium:	
Source: pH characteristics:	FETAX solution See Table A51-1
Test Organism:	
Scientific Name: Age at Start of Test:	_Xenopus_ _laevis_ Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material: Test Solution Volume:	Glass petri dishes 10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Groundwater: 50 Control: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; malformations
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek buffered groundwater; thus, an LC50 could not be calculated (Table A51-2). Embryo survival was significantly affected by exposure to 32%, 56% and 100% Canal Creek buffered groundwater by volume treatments (See Tables A51-2 and A51-3). The NOEC and LOEC for the embryos, based on increased mortality, are as follows:

NOEC: 18% buffered groundwater by volume
LOEC: 32% buffered groundwater by volume

Malformations:

There was no significant ($\alpha = 0.05$) increase in the incidence of frog embryo malformations after 96 h of exposure to 10% and 18% buffered Canal Creek groundwater (See Tables A51-2, A51-3 and A51-5). However, at the 32%, 56% and 100% Canal Creek buffered groundwater treatments; which were not included in the statistical analysis for malformations, 35% or more of the embryos were malformed.

The types of malformed embryos are given in Table A51-6.

TABLE A51-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 4)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.60	7.63	7.64	7.69	7.77	7.84
Day 1						
0 H	7.65	7.60	7.52	7.43	7.37	7.29
Day 2						
0 H	7.61	7.57	7.54	7.47	7.40	7.39
Day 3						
0 H	7.60	7.63	7.63	7.65	7.66	7.70
Day 4						
24 H	7.62	7.70	7.71	7.69	7.70	7.90

TABLE A51-2. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	25	100	2	8.0
Control	2	24	96	1	4.2
10	1	23	92	4	17.4
	2	25	100	2	8.0
18	1	23	92	4	17.4
	2	22	88	6	27.3
32	1	21	84	9	42.9
	2	18	72	5	27.8
56	1	19	76	7	36.8
	2	20	80	8	40.0
100	1	20	80	9	45.0
	2	19	76	8	42.1

TABLE A51-3. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	2.21
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	7.69
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal

Dunnett's Test:

Calculated test statistic:	See Table A51-4
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A51-4 FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - RESULTS OF DUNNETT'S TEST ON PERCENT EMBRYO MORTALITY AFTER 96 HOURS OF EXPOSURE

Conc. (% by Vol)	No. of Reps	Mean Embryo Survival[a]	T Statistic	Significance
UMD/WREC Control	2	98.0		
10	2	96.0	0.538	
18	2	90.0	2.136	
32	2	78.0	4.207	*
56	2	78.0	4.248	*
100	2	78.0	4.248	*

[a] Values given are actual percent embryo mortality rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A51-5. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 4) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE[a]

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	6.39
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	0.22
Alpha value:	0.01
Critical value:	9.21
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	4.31
Alpha value:	0.05
Critical value:	9.55
Conclusion:	Fail to reject the null hypothesis that all groups are equal

[a] The 32%, 56% and 100% raw Canal Creek groundwater treatments were not included in the statistical analyses because all concentrations above the NOEC for survival are excluded from the hypothesis test for malformation effects.

TABLE A51-6. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 4) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe							2				3	2
Gut, coiling			2	2	2	2	1	2	3	4	2	2
Edema:												
Multiple	1		2		2	4	6	2	3	2	3	1
Cardiac	1											1
Abdominal												
Facial												
Cephalic												
Blisters												
Tail												
Notochord		1										1
Fin												
Face								1	1	2	1	1
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 52

FROG EMBRYO TERATOGENESIS ASSAY - <u>Xenopus</u> (FETAX) CONDUCTED ON CANAL CREEK RAW (pH ≈4) GROUNDWATER (WELL CC-27B) (TEST NO. 5)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-7, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A52-1
Test Organism:	
Scientific Name:	<u>Xenopus</u> <u>laevis</u>
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Control: 50 Groundwater: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

Endpoints:	Mortality; malformation
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek raw groundwater; thus, an LC50 could not be calculated (Table A52-2). Embryo survival was not affected by exposure to Canal Creek raw groundwater for 96 hours (See Tables A52-2, and A52-3).

Embryo survival was not affected by exposure to APG-EA tap water relative to the UMD/WREC control embryos after 4 d of exposure.

Malformations:

Significant ($\alpha = 0.05$) embryo malformations occurred at all concentrations down to 18% raw groundwater by volume (See Tables A52-2, A52-4, and A52-5). The NOEC and LOEC for the embryos, based on increased numbers of malformations, are as follows:

NOEC = 10% raw groundwater by volume.
LOEC = 18% raw groundwater by volume.

Less than 50% of the embryos were malformed after exposure for 4 days to 100% Canal Creek raw groundwater; thus an EC50 could not be calculated (Table A52-5)

Normal embryo development was not affected by exposure to APG-EA tap water relative to the UMD/WREC control embryos.

The types of malformed embryos are given in Table A52-6.

TABLE A52-1. SUMMARY OF THE CANAL CREEK RAW GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 5)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.60	7.19	6.72	6.30	6.04	3.78
Day 1						
0 H	7.57	7.12	6.65	6.24	5.95	3.80
Day 2						
0 H	7.59	7.22	6.72	6.31	6.04	3.82
Day 3						
0 H	7.54	7.11	6.63	6.24	5.95	3.81
Day 4						
24 H	7.57	7.16	6.75	6.37	6.10	3.88

TABLE A52-2. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	24	96	1	4.2
Control	2	25	100	2	8.0
APG-EA	1	24	96	2	8.3
Diluent	2	25	100	2	8.0
10	1	25	100	3	12.0
	2	23	92	1	4.3
18	1	25	100	5	20.0
	2	24	96	9	37.5
32	1	23	92	7	30.4
	2	24	96	7	29.2
56	1	24	96	7	29.2
	2	23	92	7	30.4
100	1	21	84	10	47.6
	2	23	92	11	47.8

TABLE A52-3. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc-sine square-root

Chi-Square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed.

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	0.73
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1.57
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

TABLE A52-4. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	12.79
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	10.48
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	14.28
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A52-5
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A52-5. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	93.9		
10	2	91.7	0.468	
18	2	71.4	4.243	*
32	2	70.2	4.453	*
56	2	70.2	4.453	*
100	2	52.3	6.953	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A52-6. FETAX CANAL CREEK RAW GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe										1		
Gut, coiling					1	1	3	1	3	1	1	2
Edema:												
Multiple		1	2		2	4	1	4	3	3	5	5
Cardiac			1									
Abdominal												
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1	1			2	4	2	2	1	1	3	3
Fin												
Face				1			1			1	1	1
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 53

FROG EMBRYO TERATOGENESIS ASSAY - *Xenopus* (FETAX)
CONDUCTED ON CANAL CREEK BUFFERED (pH ≈7)
GROUNDWATER (WELL CC-27B)
(TEST NO. 5)

Test Method:	ASTM Designation E 1439-91 ASTM (1991)
Type of Test:	Static renewal (every 24 h)
Date:	May 3-7, 1995
Investigator:	S. D. Turley
Laboratory:	UMD/WREC
Groundwater:	
Source:	APG-EA Canal Creek Well CC-27B
Chemical Characteristics:	See Appendix 58
Test Medium:	
Source:	FETAX solution
pH characteristics:	See Table A53-1
Test Organism:	
Scientific Name:	*Xenopus laevis*
Age at Start of Test:	Stage 8 blastula to stage 11 gastrulae
Source:	UMD/WREC culture
Experimental Chambers:	
Material:	Glass petri dishes
Test Solution Volume:	10 mL
No. Organisms/Replicate:	25
No. Organisms/Treatment:	Groundwater: 50 Control: 50
Loading:	n/a
Lighting:	Fluorescent; 60-85 foot candles
Aeration:	Prior to renewals

pH Buffer:	10 N NaOH
Endpoints:	Mortality; malformations
Test Temperature:	24 ± 0.2°C

Results:

Mortality:

Less than 50% mortality occurred to the embryos exposed for 4 days to 100% Canal Creek buffered groundwater; thus, an LC50 could not be calculated (Table A53-2). Embryo survival was not affected by exposure for 4 days to Canal Creek buffered groundwater (See Tables A53-2 and A53-3).

Malformations:

A significant ($\alpha = 0.05$) increase in the incidence of frog embryo malformations occurred after 96 h of exposure at all concentrations down to 32% buffered Canal Creek groundwater (See Tables A53-2, A53-4 and A53-5). The NOEC and LOEC for the embryos, based on increased number of malformations, are as follows:

NOEC = 18% buffered groundwater by volume
LOEC = 32% buffered groundwater by volume

The types of malformed embryos are given in Table A53-6.

TABLE A53-1. SUMMARY OF THE CANAL CREEK BUFFERED GROUNDWATER BIOASSAY pH (STANDARD UNITS) DATA FOR FETAX (TEST NO. 5)

	Test Concentrations (Percent Groundwater by Volume)					
	0	10	18	32	56	100
Day 0						
0 H	7.60	7.55	7.57	7.39	7.35	7.20
Day 1						
0 H	7.57	7.46	7.41	7.37	7.28	7.17
Day 2						
0 H	7.59	7.50	7.43	7.36	7.30	7.21
Day 3						
0 H	7.54	7.46	7.37	7.32	7.26	7.25
Day 4						
24 H	7.57	7.51	7.47	7.40	7.31	7.29

TABLE A53-2. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - PERCENT EMBRYO SURVIVAL AND MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	Rep	Number Embryos Alive	Percent Survival	Number Embryos Malformed	Percent Malformed
UMD/WREC	1	24	96	1	4.2
Control	2	25	100	2	8.0
10	1	24	96	3	12.5
	2	23	92	1	4.3
18	1	22	88	3	13.6
	2	23	92	7	30.4
32	1	22	88	5	22.7
	2	23	92	7	30.4
56	1	22	88	5	22.7
	2	24	96	6	25.0
100	1	20	80	6	30.0
	2	23	92	8	34.8

TABLE A53-3. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - PERCENT EMBRYO SURVIVAL AFTER 96 HOURS OF EXPOSURE

Data Transformation:

Arc sine square root

Chi-square Test for Normality:

Calculated test statistic:	12.79
Alpha value:	0.01
Critical value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed

Bartlett's Test for Homogeneity of Variances:

Calculated test statistic:	1.23
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous

ANOVA:

Calculated test statistic:	1.80
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Fail to reject the null hypothesis that all groups are equal

TABLE A53-4. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - PERCENT EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Data Transformation:	
Arc sine square root	
Chi-square Test for Normality:	
Calculated test statistic:	12.79
Alpha value:	0.01
Critical Value:	13.28
Conclusion:	Fail to reject the null hypothesis that the data are normally distributed
Bartlett's Test for Homogeneity of Variances:	
Calculated test statistic:	3.12
Alpha value:	0.01
Critical value:	15.09
Conclusion:	Fail to reject the null hypothesis that the variances are homogenous
ANOVA:	
Calculated test statistic:	6.07
Alpha value:	0.05
Critical value:	4.39
Conclusion:	Reject the null hypothesis that all groups are equal
Dunnett's Test:	
Calculated test statistic:	See Table A53-5
Alpha value:	0.05
Critical value:	2.83
Conclusion:	Reject the null hypothesis that all groups are equal

TABLE A53-5 FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST STATISTICAL ANALYSIS (TEST NO. 5) - RESULTS OF DUNNETT'S TEST ON EMBRYO MALFORMATIONS AFTER 96 HOURS OF EXPOSURE

Conc (% by Vol)	No. of Reps	Mean Normal Embryos (%)[a]	T Statistic	Significance
UMD/WREC Control	2	93.9		
10	2	91.5	0.463	
18	2	77.8	2.812	
32	2	73.3	3.526	*
56	2	76.1	3.164	*
100	2	67.4	4.306	*

[a] Values given are actual percent mean normal embryos rather than arc sine square root transformed means which were used in the statistical analysis.

* Significantly different at alpha = 0.05 (Dunnett's critical value = 2.83).

TABLE A53-6. FETAX CANAL CREEK BUFFERED GROUNDWATER TOXICITY TEST DATA (TEST NO. 5) - TYPE AND NUMBER OF MALFORMED EMBRYOS AFTER 96 HOURS OF EXPOSURE

Malformation	Test Concentrations (% Groundwater by Volume)											
	0		10		18		32		56		100	
	Rep		Rep		Rep		Rep		Rep		Rep	
	1	2	1	2	1	2	1	2	1	2	1	2
Severe						1	1					1
Gut, coiling				1	1	3	1	3	4	5	5	6
Edema:												
Multiple		1	1				1	3				
Cardiac							1	1				
Abdominal						3						
Facial												
Cephalic												
Blisters												
Tail												
Notochord	1	1	1		1		1		1	1		
Fin												
Face			1		1						1	1
Eye												
Brain												
Hemorrhage												
Cardiac												
Other												

APPENDIX 54

DISPOSITION OF FISH DURING THE JAPANESE MEDAKA CHRONIC HISTOPATHOLOGY STUDY

TABLE A54-1. DISPOSITION OF FISH DURING THE JAPANESE MEDAKA CHRONIC HISTOPATHOLOGY STUDY

Tank	6 Months			9 Months						
No.[a]	DOA[b]	Not Sexed	Used in Growth Analyses	DOA[b]	Not Sexed	Used in Growth Analyses	UMBC[c]	Not Found[d]	Dead[e]	Total
1			20			18	5	12	5	60
2			20	7		24	5		9	65
3			21			27	5		7	60
4			20			22	5	4	9	60
5			20	1		24	5	1	9	60
6			20	2	1	23	5	2	7	60
7	1		19	2	1	18	5	5	9[f]	60
8			20	1		18	5	8	8	60
9	1		19			24	5	4	7	60
10			21			30	5	2	2	60
11			20			16	5	6	13	60
12	2		18			27	5	3	5	60
13			20			27	5	2	6	60
14			20			21	5	4	10	60
15			20	1		23	5		11	60
16			20	1		18	5	3	13[g]	60
17			20			32			8	60
18			20	1		41			6	68
19		1[h]	19	8		25		3	4	60
20		1	19	1		36		2	1	60
21			20	1		27		4	8	60
22			20			31		2	7	60
23			20	4		29		4	3	60
24			20			34		1	5	60
25			20	7		26		1	6[i]	60
26			20			35		2	3	60
27	2[j]		18	1		34			5	60
28			20			32		3	5	60
29			20	1		28		2	9	60
30	1		18	2		29		2	8	60

TABLE A54-1. (CONTINUED)

Tank No.[a]	6 Months			9 Months						Total
	DOA[b]	Not Sexed	Used in Growth Analyses	DOA[b]	Not Sexed	Used in Growth Analyses	UMBC[c]	Not Found[d]	Dead[e]	
31			20			30		3	7	60
32			20			37			3	60
33			20			37		1	2	60
34			20			39		1		60
35		1	19			36		2	2	60
36			19 (20)[k]			38			2	60

[a] The treatment for each tank is given in Appendix 57, page A57-3 under the heading Group ID (i.e., tank 1 is Group ID 1, etc.).
[b] Fish that died while being transported from APG-EA to USABRDL for morphometric measurements.
[c] Fish given to the University of Maryland Baltimore Campus at the end of 9 months for exploratory analyses not related to this study; thus, the analyses are not included in this report.
[d] Fish that could not be accounted for at the end of 9 months.
[e] Total number of dead fish at the end of 9 months.
[f] Eight dead and one moribund.
[g] Seven dead and one moribund.
[h] Fish inadvertently misplaced before histopathology was conducted.
[i] Five dead and one moribund.
[j] One fish died while being transported from APG-EA to USABRDL; the second dead fish was too autolyzed for histopathology.
[k] Nineteen fish were used in the growth analyses; the twentieth fish had incomplete measurement data and thus was not used in the morphometric analyses.

APPENDIX 55

GROWTH MEASUREMENTS OF THE SIX-MONTH INTERIM AND NINE-MONTH FINAL JAPANESE MEDAKA IN THE CHRONIC HISTOPATHOLOGY STUDY

TABLE A55-1. SIX-MONTH INTERIM GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED FEBRUARY 8, 1995; TEST DAY 181) - WEST BRANCH OF CANAL CREEK

Tank 1 Males			Tank 1 Females			Tank 2 Males			Tank 2 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	377	30	1	379	25	1	298	26	1	299	26
2	405	27	2	397	27	2	424	26	2	358	27
3	434	27	3	321	25	3	286	25	3	368	27
4	333	24	4	434	29	4	307	25	4	318	26
5	344	25	5	387	25	5	327	25	5	374	27
6	369	25	6	309	27	6	298	25	6	370	27
7	341	26	7	398	26	7	323	24	7	320	27
8	427	26	8	477	23	8	373	25	8	386	25
9	321	25				9	380	27	9	399	25
10	404	28				10	351	27			
11	246	22				11	328	29			
12	384	30									
Mean	365	26		388	26		336	26		355	26
S.D.	52.6	2.3		54.8	1.8		42.2	1.4		34.3	0.9
Min	246	22		309	23		286	24		299	25
Max	434	30		477	29		424	29		399	27
N	12	12		8	8		11	11		9	9

TABLE A55-1. (CONTINUED) - WEST BRANCH OF CANAL CREEK

Tank 3 (DEN) Males			Tank 3 (DEN) Females			Tank 4 (DEN) Males			Tank 4 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	344	25	1	399	28	1	356	28	1	315	25
2	320	25	2	334	25	2	487	25	2	330	27
3	298	25	3	539	29	3	329	27	3	448	30
4	359	27	4	397	25	4	481	30	4	463	30
5	303	26	5	408	29	5	406	27	5	461	29
6	430	29	6	340	26	6	293	24	6	418	31
7	309	28	7	359	28	7	370	28	7	407	26
8	327	26	8	355	25	8	299	26	8	390	28
9	320	25	9	333	27	9	251	24	9	337	24
10	386	29	10	546	30	10	350	28	10	439	26
			11	403	27						
Mean	340	27		401	27		362	27		401	28
S.D.	41.7	1.6		75.4	1.8		77.5	1.9		55.9	2.4
Min	298	25		333	25		251	24		315	24
Max	430	29		546	30		487	30		463	31
N	10	10		11	11		10	10		10	10

TABLE A55-1. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH CANAL OF CREEK WATER

Tank 5 Males			Tank 5 Females			Tank 6 Males			Tank 6 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	373	29	1	361	25	1	533	28	1	430	30
2	428	28	2	355	26	2	301	29	2	430	26
3	362	27	3	475	27	3	259	21	3	417	26
4	450	25	4	318	27	4	350	25	4	285	25
5	462	28	5	509	29	5	381	27	5	409	26
6	373	25	6	454	25	6	323	25	6	328	25
7	454	28	7	509	28	7	221	21	7	440	27
8	301	25	8	396	28				8	404	28
9	357	28							9	251	21
10	309	25							10	322	23
11	312	26							11	371	25
12	241	25							12	454	27
									13	338	26
Mean	369	27		422	27		338	25		375	26
S.D.	70.1	1.6		74.3	1.5		101.3	3.2		64.6	2.2
Min	241	25		318	25		221	21		251	21
Max	462	29		509	29		533	29		454	30
N	12	12		8	8		7	7		13	13

TABLE A55-1. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH CANAL OF CREEK WATER

Tank 7 (DEN) Males			Tank 7 (DEN) Females			Tank 8 (DEN) Males			Tank 8 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	240	24	1	464	28	1	453	31	1	417	25
2	266	24	2	432	28	2	438	27	2	495	26
3	364	26	3	398	26	3	352	25	3	399	25
4	331	25	4	461	28	4	473	29	4	332	25
5	372	27	5	409	26	5	267	24	5	436	27
6	377	26	6	405	27	6	302	25	6	496	27
7	287	25	7	477	27	7	390	25	7	275	24
8	360	25	8	380	27	8	302	22	8	363	28
9	443	26	9	448	28				9	491	28
10	318	21							10	357	24
									11	385	23
									12	290	24
Mean	336	25		430	27		372	26		395	26
S.D.	60.2	1.7		34.0	0.8		78.1	2.9		76.0	1.7
Min	240	21		380	26		267	22		275	23
Max	443	27		477	28		473	31		496	28
N	10	10		9	9		8	8		12	12

TABLE A55-1. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 9 Males			Tank 9 Females			Tank 10 Males			Tank 10 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	372	25	1	502	26	1	358	24	1	383	25
2	346	26	2	467	25	2	382	25	2	305	23
3	322	26	3	493	29	3	276	25	3	389	25
4	377	27	4	354	25	4	361	26	4	439	30
5	353	26	5	349	25	5	309	25	5	324	25
6	493	26				6	305	25	6	475	28
7	462	29				7	422	29	7	431	27
8	465	28				8	581	28	8	361	26
9	351	25							9	458	29
10	423	30							10	403	28
11	585	30							11	328	25
12	306	25							12	375	25
13	560	30							13	332	25
14	296	24									
Mean	408	27		354	26		433	26		374	26
S.D.	92.3	2.1		75.5	1.7		95.8	1.7		54.5	2.0
Min	296	24		349	25		276	24		305	23
Max	585	30		502	29		581	29		475	30
N	14	14		5	5		8	8		13	13

TABLE A55-1. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 11 (DEN) Males			Tank 11 (DEN) Females			Tank 12 (DEN) Males			Tank 12 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	239	27	1	389	28	1	375	24	1	366	26
2	376	26	2	414	26	2	403	26	2	299	25
3	381	26	3	278	26	3	405	27	3	418	25
4	431	27	4	365	25	4	367	26	4	428	26
5	432	26	5	324	27	5	260	23	5	376	25
6	311	25	6	387	25	6	308	23	6	422	25
7	236	28	7	318	25	7	337	24	7	371	27
8	420	27	8	289	24				8	360	23
9	348	26							9	393	28
10	351	25							10	343	23
11	377	25							11	317	26
12	387	26									
Mean	357	26		346	26		351	25		372	25
S.D.	66.1	0.9		50.2	1.3		52.9	1.6		41.9	1.5
Min	236	25		278	24		260	23		299	23
Max	432	28		414	28		405	27		428	28
N	12	12		8	8		7	7		11	11

TABLE A55-1. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK

Tank 13 Males			Tank 13 Females			Tank 14 Males			Tank 14 Females	
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)
1	502	26	1	403	26	1	369	26	1	516
2	326	24	2	445	24	2	656	27	2	401
3	489	27	3	393	26	3	478	26	3	424
4	316	24	4	369	28	4	407	25	4	348
5	489	28	5	412	29	5	518	29	5	490
6	358	25	6	422	25	6	430	27	6	517
7	420	27	7	432	27	7	315	24	7	365
8	500	27	8	295	24	8	489	26	8	340
9	453	28	9	487	29	9	285	20		
10	288	24				10	298	25		
11	347	24				11	359	26		
						12	394	30		
Mean	408	26		406	26		417	26		425
S.D.	82.7	1.7		53.5	1.9		106.5	2.5		74.0
Min	288	24		295	24		285	20		340
Max	502	28		487	29		656	30		517
N	11	11		9	9		12	12		8

TABLE A55-1. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 15 (DEN) Males			Tank 15 (DEN) Females			Tank 16 (DEN) Males			Tank 16 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	591	27	1	412	25	1	453	28	1	406	25
2	380	25	2	485	25	2	425	25	2	365	24
3	417	25	3	409	25	3	430	25	3	402	27
4	347	25	4	315	25	4	544	27	4	411	26
5	317	23	5	508	27	5	528	30	5	365	25
6	406	25	6	411	25	6	416	26	6	322	24
7	311	22				7	576	30	7	387	24
8	358	22				8	421	27	8	359	25
9	568	30				9	308	24	9	375	25
10	500	25				10	382	24			
11	323	25				11	351	25			
12	339	25									
13	412	29									
14	358	25									
Mean	402	25		423	25		439	26		377	25
S.D.	90.4	2.3		68.1	0.8		82.0	2.2		28.2	1.0
Min	311	22		315	25		308	24		322	24
Max	591	30		508	27		576	30		411	27
N	14	14		6	6		11	11		9	9

TABLE A55-2. SIX-MONTH INTERIM GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED FEBRUARY 8, 1995; TEST DAY 181) - APG-EA TAP WATER

Tank 17 Males			Tank 17 Females			Tank 18 Males			Tank 18 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	429	30	1	534	27	1	422	26	1	243	24
2	412	27	2	372	25	2	469	30	2	70	15
3	367	28	3	432	30	3	543	31	3	334	26
4	426	29	4	671	32	4	335	27	4	218	23
5	434	30	5	320	25	5	342	24	5	399	29
6	337	25	6	319	25	6	345	25	6	332	24
7	359	26	7	368	26	7	440	29	7	284	26
			8	374	26	8	406	30	8	340	25
			9	331	26	9	424	29			
			10	360	25	10	243	24			
			11	311	26	11	239	25			
			12	305	25	12	232	25			
			13	251	21						
Mean	395	28		381	26		370	27		278	24
S.D.	39.5	2.0		111.2	2.6		98.4	2.6		101.9	4.1
Min	337	25		251	21		232	24		70	15
Max	434	30		671	32		543	31		399	29
N	7	7		13	13		12	12		8	8

TABLE A55-2. (CONTINUED) - APG-EA TAP WATER

Tank 19 (DEN) Males			Tank 19 (DEN) Females			Tank 20 (DEN) Males			Tank 20 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	482	31	1	335	28	1	392	26	1	464	32
2	336	27	2	570	31	2	274	26	2	431	29
3	427	30	3	423	31	3	438	27	3	427	28
4	308	26	4	526	31	4	436	29	4	512	30
5	566	31	5	563	31	5	321	25	5	508	30
6	523	30	6	461	29	6	477	30	6	381	30
7	251	26	7	406	31	7	420	28	7	357	23
8	542	31	8	267	26	8	420	29	8	325	25
9	573	35	9	402	36	9	382	26			
10	309	28				10	364	29			
						11	441	29			
Mean	432	30		439	30		397	28		426	28
S.D.	121.7	2.8		102.3	2.7		59.0	1.7		68.2	3.0
Min	251	26		267	26		274	25		325	23
Max	573	35		570	36		477	30		512	32
N	10	10		9	9		11	11		8	8

TABLE A55-2. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 21 Males			Tank 21 Females			Tank 22 Males			Tank 22 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	379	29	1	518	30	1	437	30	1	282	26
2	372	28	2	416	27	2	468	29	2	405	26
3	356	27	3	324	28	3	295	25	3	386	29
4	360	26	4	440	29	4	434	28	4	330	28
5	393	27	5	539	31	5	520	30	5	361	24
6	409	27	6	415	28	6	318	26	6	300	25
7	277	25	7	323	27	7	367	26	7	351	28
8	319	26	8	408	31	8	371	30	8	337	25
			9	377	27	9	282	25	9	315	25
			10	451	27	10	423	27	10	286	25
			11	416	30						
			12	361	26						
Mean	358	27		416	28		392	28		335	26
S.D.	42.3	1.2		66.8	1.7		78.1	2.1		41.2	1.7
Min	277	25		323	26		282	25		282	24
Max	409	29		539	31		520	30		405	29
N	8	8		12	12		10	10		10	10

TABLE A55-2. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 23 (DEN) Males			Tank 23 (DEN) Females			Tank 24 (DEN) Males			Tank 24 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	327	23	1	505	30	1	351	25	1	498	26
2	345	27	2	459	30	2	304	26	2	459	28
3	389	27	3	379	25	3	357	25	3	334	26
4	429	27	4	471	29	4	454	30	4	320	25
5	525	30	5	391	27	5	378	27	5	334	28
6	207	26	6	638	31	6	358	26	6	246	28
7	508	27	7	343	26	7	521	29	7	447	31
8	372	26	8	352	28	8	314	25			
9	298	23				9	393	27			
10	407	30				10	333	25			
11	408	28				11	312	24			
12	368	26				12	428	29			
						13	337	27			
Mean	382	27		442	28		372	27		377	27
S.D.	86.5	2.2		98.6	2.1		63.1	1.9		91.6	2.0
Min	207	23		343	25		304	24		246	25
Max	525	30		638	31		521	30		498	31
N	12	12		8	8		13	13		7	7

TABLE A55-2 . (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 25 Males			Tank 25 Females			Tank 26 Males			Tank 26 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	371	27	1	461	32	1	396	28	1	370	28
2	472	32	2	461	29	2	470	28	2	290	24
3	433	28	3	388	27	3	370	28	3	329	28
4	562	31	4	378	27	4	640	33	4	403	32
5	146	18	5	376	27	5	426	30	5	315	27
6	311	27	6	299	25	6	430	30	6	371	26
7	393	28	7	388	31	7	379	27	7	412	27
			8	450	27	8	385	29	8	393	29
			9	434	28	9	449	29	9	353	28
			10	472	28	10	436	28			
			11	267	26	11	344	25			
			12	395	29						
			13	254	26						
Mean	384	27		386	28		430	29		360	28
S.D.	131.7	4.5		73.3	2.0		79.3	2.0		41.5	2.2
Min	146	18		254	25		344	25		290	24
Max	562	32		472	32		640	33		412	32
N	7	7		13	13		11	11		9	9

TABLE A55-2 . (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 27 (DEN) Males			Tank 27 (DEN) Females			Tank 28 (DEN) Males			Tank 28 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	406	28	1	349	26	1	649	34	1	274	26
2	474	32	2	385	29	2	691	32	2	517	31
3	410	29	3	411	29	3	409	28	3	417	29
4	319	28	4	395	27	4	544	31	4	347	27
5	321	28	5	517	30	5	530	31	5	418	29
6	302	26	6	329	27	6	352	27	6	418	29
7	322	27	7	268	27	7	594	32	7	358	26
8	363	27	8	397	30	8	410	29	8	466	28
9	276	27	9	230	26	9	410	27	9	374	27
						10	313	24	10	344	27
Mean	355	28		365	28		490	30		393	28
S.D.	63.7	1.7		84.2	1.6		129.4	3.0		69.0	1.6
Min	276	26		230	26		313	24		274	26
Max	474	32		517	30		691	34		517	31
N	9	9		9	9		10	10		10	10

TABLE A55-2. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 29 Males			Tank 29 Females			Tank 30 Males			Tank 30 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	462	27	1	450	29	1	318	25	1	441	29
2	393	30	2	500	30	2	519	31	2	321	27
3	376	29	3	258	25	3	304	24	3	522	31
4	426	29	4	320	26	4	392	26	4	292	27
5	328	26	5	241	29	5	447	28	5	349	27
6	390	26	6	492	28	6	479	29			
			7	434	31	7	341	27			
			8	266	26	8	508	31			
			9	376	31	9	364	30			
			10	533	31	10	487	28			
			11	344	25	11	401	30			
			12	222	25	12	450	29			
			13	341	26	13	251	24			
			14	486	29						
Mean	396	28		376	28		405	28		385	28
S.D.	45.4	1.7		106.6	2.4		85.2	2.5		94.8	1.8
Min	328	26		222	25		251	24		292	27
Max	462	30		533	31		519	31		522	31
N	6	6		14	14		13	13		5	5

TABLE A55-2. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 31 (DEN) Males			Tank 31 (DEN) Females			Tank 32 (DEN) Males			Tank 32 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	607	31	1	417	29	1	383	28	1	331	26
2	457	29	2	544	32	2	327	28	2	338	23
3	502	31	3	355	25	3	488	25	3	351	25
4	428	29	4	463	29	4	349	25	4	305	24
5	300	20	5	440	30	5	396	26	5	364	24
6	291	26	6	352	27	6	325	26	6	382	26
7	272	26	7	307	25	7	481	31	7	279	26
8	357	25	8	420	27	8	369	25	8	507	29
9	452	30	9	291	28	9	338	27	9	361	27
10	406	30	10	287	28	10	410	29	10	353	26
Mean	407	28		388	28		387	27		357	26
S.D.	105.2	3.5		83.7	2.2		58.9	2.0		60.6	1.7
Min	272	20		287	25		325	25		279	23
Max	607	31		544	32		488	31		507	29
N	10	10		10	10		10	10		10	10

TABLE A55-3. SIX-MONTH INTERIM GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED FEBRUARY 10, 1995; TEST DAY 183) - CEHR CONTROL FISH

Tank 33 Males			Tank 33 Females			Tank 34 Males			Tank 34 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	80	16	1	186	25	1	385	28	1	220	24
2	161	25	2	167	22	2	276	26	2	228	26
3	191	22	3	276	26	3	193	24	3	345	31
4	173	21	4	182	24	4	373	29	4	190	23
5	186	21	5	147	22	5	250	22	5	228	24
6	159	21	6	66	21	6	228	24	6	282	23
7	232	25	7	125	21	7	201	25	7	254	26
8	258	25	8	275	26	8	184	22	8	160	20
9	181	23	9	290	24	9	213	24	9	241	26
10	182	22	10	170	22	10	248	25	10	308	25
Mean	180	22		188	23		255	25		246	25
S.D.	46.9	2.7		72.3	1.9		71.2	2.3		54.7	2.9
Min	80	16		66	21		184	22		160	20
Max	258	25		290	26		385	29		345	31
N	10	10		10	10		10	10		10	10

TABLE A55-3. SIX-MONTH INTERIM GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED FEBRUARY 10, 1995; TEST DAY 183) - CEHR CONTROL FISH

Tank 35 (DEN) Males			Tank 35 (DEN) Females			Tank 36 (DEN) Males			Tank 36 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	230	24	1	178	22	1	270	26	1	256	26
2	128	20	2	162	22	2	159	22	2	196	25
3	108	16	3	219	22	3	233	25	3	232	22
4	225	24	4	174	22	4	160	21	4	208	21
5	146	21	5	241	22	5	356	28	5	209	25
6	135	21	6	170	18	6	136	20	6	176	20
7	307	25	7	215	22	7	147	21	7	116	20
8	89	17	8	119	17	8	310	26			
9	223	23	9	205	25	9	139	21			
			10	106	19	10	305	26			
						11	156	22			
						12	138	22			
Mean	177	21		179	21		209	23		199	23
S.D.	72.2	3.2		43.1	2.4		81.0	2.7		44.6	2.6
Min	89	16		106	17		136	20		116	20
Max	307	25		241	25		356	28		256	26
N	9	9		10	10		12	12		7	7

TABLE A55-4. NINE-MONTH FINAL GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLGY EXPOSURE STUDY (SACRIFICED MAY 10, 1995; TEST DAY 272) - WEST BRANCH OF CANAL CREEK

Tank 1 Males			Tank 1 Females			Tank 2 Males			Tank 2 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	573	30	1	386	29	1	313	26	1	590	29
2	458	27	2	523	30	2	388	27	2	693	33
3	499	27	3	658	31	3	479	29	3	315	26
4	348	25	4	620	30	4	554	29	4	490	29
5	480	27	5	739	31	5	259	23	5	665	30
6	344	26	6	731	30	6	299	24	6	597	29
7	449	27	7	559	27	7	479	26	7	298	26
8	463	29	8	492	27	8	466	28	8	438	29
9	377	27				9	481	29	9	410	27
10	444	27				10	360	27	10	360	26
									11	340	26
									12	336	24
									13	543	30
									14	342	25
Mean	444	27		589	29		408	27		458	28
S.D.	70.9	1.4		122.0	1.6		97.7	2.1		136.9	2.5
Min	344	25		386	27		259	23		298	24
Max	573	30		739	31		554	29		693	33
N	10	10		8	8		10	10		14	14

A55-4. (CONTINUED) - WEST BRANCH OF CANAL CREEK

Tank 3 (DEN) Males			Tank 3 (DEN) Females			Tank 4 (DEN) Males			Tank 4 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	427	28	1	372	26	1	479	26	1	523	30
2	383	27	2	411	26	2	417	27	2	392	27
3	465	27	3	484	29	3	302	25	3	480	28
4	328	26	4	426	27	4	535	29	4	365	25
5	323	26	5	411	27	5	456	28	5	446	30
6	373	27	6	466	29	6	375	27	6	687	30
7	449	27	7	392	24				7	841	33
8	361	26	8	272	23				8	479	29
9	420	26	9	505	27				9	543	30
10	279	25	10	435	27				10	492	30
11	362	26	11	744	32				11	749	32
			12	444	28				12	422	27
			13	471	28				13	431	26
			14	478	29				14	421	26
			15	480	25				15	433	29
			16	407	26				16	400	27
Mean	379	26		450	27		427	27		507	29
S.D.	57.2	0.8		96.6	2.2		82.0	1.4		136.7	2.2
Min	279	25		272	23		302	25		365	25
Max	465	28		744	32		535	29		841	33
N	11	11		16	16		6	6		16	16

TABLE A55-4. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH CANAL OF CREEK WATER

Tank 5 Males			Tank 5 Females			Tank 6 Males			Tank 6 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	525	29	1	661	30	1	451	30	1	492	28
2	456	28	2	584	30	2	651	29	2	565	30
3	452	27	3	503	28	3	392	25	3	779	32
4	650	31	4	477	29	4	431	27	4	482	26
5	508	29	5	579	30	5	445	26	5	736	32
6	612	29	6	553	29	6	406	27	6	389	28
7	470	26	7	567	29	7	301	26	7	376	27
8	465	30	8	465	27	8	563	28	8	559	31
9	324	26	9	427	28	9	459	25	9	388	27
10	373	27	10	340	27	10	494	30	10	400	28
11	394	27	11	461	29	11	376	24	11	316	24
			12	452	28				12	502	30
			13	500	28						
Mean	475	28		505	29		452	27		499	29
S.D.	96.8	1.6		83.0	1.0		94.1	2.0		143.2	2.5
Min	324	26		340	27		301	24		316	24
Max	650	31		661	30		651	30		779	32
N	11	11		13	13		11	11		12	12

TABLE A55-4. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH CANAL OF CREEK WATER

Tank 7 (DEN) Males			Tank 7 (DEN) Females			Tank 8 (DEN) Males			Tank 8 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	601	27	1	516	29	1	427	28	1	581	29
2	345	24	2	585	30	2	463	27	2	581	30
3	457	25	3	468	28	3	439	30	3	820	30
4	297	23	4	445	28	4	450	28	4	553	30
5	454	29	5	498	27	5	398	27			
6	316	25	6	511	29	6	452	26			
7	229	23	7	557	28	7	374	25			
8	364	26	8	614	30	8	417	26			
9	294	25	9	367	25	9	485	30			
						10	365	26			
						11	427	26			
						12	328	24			
						13	344	24			
						14	431	25			
Mean	373	25		507	28		414	27		634	30
S.D.	113.2	1.9		75.1	1.6		46.4	1.9		124.9	0.5
Min	229	23		367	25		328	24		553	29
Max	601	29		614	30		485	30		820	30
N	9	9		9	9		14	14		4	4

TABLE A55-4. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 9 Males			Tank 9 Females			Tank 10 Males			Tank 10 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	429	27	1	467	27	1	612	31	1	445	29
2	446	27	2	405	27	2	520	32	2	442	30
3	337	27	3	613	29	3	478	29	3	434	27
4	529	30	4	327	27	4	371	27	4	399	28
5	491	28	5	402	26	5	480	29	5	573	30
6	319	25	6	659	30	6	513	29	6	441	26
7	553	29	7	547	30	7	446	28	7	337	28
8	513	28	8	335	25	8	451	29	8	773	32
9	400	26	9	434	28	9	323	25	9	500	29
10	358	27	10	599	30	10	394	26	10	327	26
11	416	27	11	506	27				11	517	29
12	362	27	12	397	27				12	513	30
									13	405	27
									14	483	28
									15	648	29
									16	573	29
									17	506	29
									18	507	30
									19	588	29
									20	350	26
Mean	429	27		474	28		459	29		488	29
S.D.	78.4	1.3		110.4	1.7		82.7	2.1		108.9	1.6
Min	319	25		327	25		323	25		327	26
Max	553	30		659	30		612	32		773	32
N	12	12		12	12		10	10		20	20

TABLE A55-4. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 11 (DEN) Males			Tank 11 (DEN) Females			Tank 12 (DEN) Males			Tank 12 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	401	27	1	428	30	1	398	27	1	529	31
2	462	25	2	558	30	2	317	25	2	594	30
3	407	26	3	508	28	3	453	26	3	338	25
4	410	26	4	533	31	4	321	25	4	302	25
5	441	27	5	616	31	5	385	25	5	332	26
6	429	28	6	469	27	6	380	25	6	512	28
			7	476	30	7	425	28	7	438	26
			8	484	28	8	357	25	8	444	28
			9	666	31	9	401	26	9	475	27
			10	569	30	10	418	25	10	447	28
						11	365	26	11	483	29
									12	375	29
									13	489	30
									14	366	26
									15	400	26
									16	398	27
Mean	425	27		531	30		384	26		433	28
S.D.	23.5	1.0		72.9	1.4		42.0	1.0		79.9	1.9
Min	401	25		428	27		317	25		302	25
Max	462	28		666	31		453	28		594	31
N	6	6		10	10		11	11		16	16

TABLE A55-4. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 13 Males			Tank 13 Females			Tank 14 Males			Tank 14 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	532	28	1	363	27	1	580	30	1	574	29
2	483	30	2	486	30	2	400	27	2	487	28
3	462	26	3	601	30	3	561	30	3	426	29
4	514	28	4	513	29	4	358	27	4	429	27
5	349	26	5	622	30	5	567	30	5	609	30
6	552	30	6	481	29	6	463	27	6	469	28
7	331	25	7	690	30	7	412	27	7	593	30
8	539	29	8	667	29	8	311	24	8	527	27
9	518	28	9	380	27	9	439	26	9	490	27
10	497	30	10	413	26	10	474	25	10	346	26
11	414	28	11	600	30				11	549	28
12	627	30	12	508	30						
13	550	28									
14	460	27									
15	673	33									
Mean	500	28		527	29		457	27		500	28
S.D.	91.2	2.0		109.5	1.4		91.3	2.1		80.4	1.3
Min	331	25		363	26		311	24		346	26
Max	673	33		690	30		580	30		609	30
N	15	15		12	12		10	10		11	11

TABLE A55-4. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH WEST BRANCH OF CANAL CREEK WATER

Tank 15 (DEN) Males			Tank 15 (DEN) Females			Tank 16 (DEN) Males			Tank 16 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	606	30	1	428	28	1	468	28	1	609	30
2	428	27	2	685	26	2	370	26	2	560	32
3	388	27	3	547	30	3	593	31	3	670	31
4	480	27	4	564	32	4	470	27	4	779	32
5	464	27	5	488	29	5	437	27	5	433	28
6	532	28	6	665	31	6	765	32	6	524	30
7	493	30	7	528	29	7	472	29	7	543	28
8	466	27	8	635	29	8	316	25	8	463	28
9	614	30	9	498	29				9	750	31
10	517	29	10	531	29				10	748	31
11	331	24	11	467	29						
12	649	30									
Mean	497	28		549	29		486	28		608	30
S.D.	93.8	1.9		82.5	1.5		138.8	2.4		123.9	1.6
Min	331	24		428	26		316	25		433	28
Max	649	30		685	32		765	32		779	32
N	12	12		11	11		8	8		10	10

TABLE A55-5. NINE-MONTH FINAL GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED MAY 10, 1995; TEST DAY 272) - APG-EA TAP WATER

Tank 17 Males			Tank 17 Females			Tank 18 Males			Tank 18 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	356	27	1	602	31	1	532	28	1	822	35
2	510	28	2	554	31	2	602	29	2	411	29
3	556	31	3	506	28	3	646	32	3	438	26
4	517	32	4	338	27	4	369	28	4	645	31
5	408	29	5	540	28	5	489	29	5	510	28
6	369	28	6	368	27	6	249	24	6	589	32
7	348	29	7	431	29	7	418	27	7	551	30
8	249	24	8	418	29	8	437	27	8	510	29
9	288	25	9	704	33	9	349	26	9	468	27
10	405	28	10	551	30	10	551	29	10	400	26
11	452	30				11	434	24	11	626	32
12	449	27				12	604	29	12	495	30
13	467	27				13	240	22	13	518	30
14	484	30							14	265	24
15	402	23							15	695	30
16	511	29							16	450	28
17	437	28							17	679	29
18	515	29							18	537	28
19	517	28							19	542	28
20	367	26							20	453	27
21	510	28							21	340	27
22	400	27							22	540	31
									23	351	24
									24	276	27
									25	400	30
									26	496	30
									27	294	24
									28	498	28

TABLE A55-5. (CONTINUED) - APG-EA TAP WATER

Tank 17 Males			Tank 17 Females			Tank 18 Males			Tank 18 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
Mean	433	28		501	29		455	27		493	29
S.D.	81.1	2.1		112.7	1.9		131.0	2.7		130.3	2.6
Min	249	23		338	27		240	22		265	24
Max	556	32		704	33		646	32		822	35
N	22	22		10	10		13	13		28	28

TABLE A55-5. (CONTINUED) - APG-EA TAP WATER

Tank 19 (DEN) Males			Tank 19 (DEN) Females			Tank 20 (DEN) Males			Tank 20 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	511	29	1	519	27	1	659	31	1	531	28
2	642	30	2	580	29	2	585	29	2	634	30
3	861	33	3	795	32	3	617	31	3	540	29
4	399	28	4	521	30	4	563	29	4	570	30
5	496	29	5	477	30	5	420	25	5	509	29
6	777	31	6	538	28	6	414	27	6	800	32
7	459	25	7	500	29	7	508	30	7	787	32
8	579	29				8	457	27	8	700	29
9	445	28				9	338	25	9	548	29
10	406	27				10	426	26	10	694	31
11	485	28				11	438	25	11	605	28
12	493	29				12	556	30	12	544	28
13	616	30				13	542	30	13	633	30
14	649	29				14	497	27	14	600	30
15	814	31				15	661	30	15	425	26
16	506	29				16	396	26	16	481	29
17	445	29				17	452	29	17	559	24
18	673	30							18	573	28
									19	340	28
Mean	570	29		561	29		502	28		583	29
S.D.	140.8	1.7		107.8	1.6		95.3	2.2		112.7	1.9
Min	399	25		477	27		338	25		340	24
Max	861	33		795	32		661	31		800	32
N	18	18		7	7		17	17		19	19

TABLE A55-5. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAPWATER

Tank 21 Males			Tank 21 Females			Tank 22 Males			Tank 22 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	553	27	1	1034	38	1	553	31	1	523	30
2	678	33	2	471	28	2	605	30	2	426	27
3	516	30	3	520	30	3	586	29	3	407	28
4	402	27	4	527	28	4	409	27	4	574	30
5	650	30	5	478	30	5	419	26	5	273	24
6	359	26	6	643	30	6	552	28	6	352	28
7	581	31	7	537	30	7	434	27	7	815	33
8	411	26	8	441	28	8	327	27	8	326	27
9	602	30	9	889	33				9	418	27
10	536	29	10	679	27				10	363	26
11	480	26	11	549	30				11	624	30
12	409	27	12	600	30				12	691	32
13	444	27	13	405	27				13	774	32
			14	677	30				14	747	30
									15	500	27
									16	502	27
									17	706	29
									18	366	27
									19	560	31
									20	468	28
									21	334	26
									22	378	27
									23	402	28
Mean	509	28		604	30		486	28		501	28
S.D.	101.5	2.3		175.2	2.8		101.0	1.7		158.6	2.2
Min	359	26		405	27		327	26		273	24
Max	678	33		1034	38		605	31		815	33
N	13	13		14	14		8	8		23	23

TABLE A55-5. (CONTINUED) - 1% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAPWATER

Tank 23 (DEN) Males			Tank 23 (DEN) Females			Tank 24 (DEN) Males			Tank 24 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	573	29	1	310	26	1	658	31	1	589	30
2	405	28	2	621	30	2	523	29	2	311	26
3	418	27	3	433	29	3	600	30	3	534	30
4	491	30	4	473	29	4	482	29	4	564	31
5	507	27	5	528	29	5	315	25	5	522	28
6	555	29	6	514	29	6	555	30	6	617	31
7	459	29	7	411	28	7	569	29	7	468	28
8	393	27	8	633	31	8	401	27	8	544	30
9	346	26	9	378	26	9	357	28	9	513	28
10	558	28	10	670	29	10	516	29	10	844	35
11	422	27	11	451	25	11	455	30	11	527	27
12	594	30	12	628	31	12	504	27	12	462	28
13	343	24	13	480	30	13	517	29	13	451	29
14	680	31	14	383	27	14	560	29	14	332	28
15	586	30							15	445	27
									16	608	30
									17	532	30
									18	472	30
									19	390	25
									20	391	27
Mean	489	28		494	29		501	29		506	29
S.D.	100.7	1.8		110.5	1.9		93.7	1.5		116.3	2.2
Min	343	24		310	25		315	25		311	25
Max	680	31		670	31		658	31		844	35
N	15	15		14	14		14	14		20	20

TABLE A55-5. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 25 Males			Tank 25 Females			Tank 26 Males			Tank 26 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	621	31	1	750	32	1	491	29	1	631	29
2	527	30	2	506	29	2	505	29	2	440	28
3	642	30	3	714	31	3	437	27	3	845	34
4	437	28	4	555	29	4	813	33	4	401	28
5	569	31	5	448	27	5	592	29	5	591	30
6	847	31	6	501	29	6	458	27	6	524	28
7	659	28	7	531	30	7	441	25	7	431	27
8	413	27	8	580	31	8	422	27	8	368	28
9	612	31	9	342	26	9	450	30	9	593	30
10	550	29	10	369	25	10	447	28	10	399	27
11	433	27	11	575	27	11	444	27	11	451	27
12	352	24	12	601	30	12	657	32	12	490	28
			13	451	29	13	500	30	13	639	29
			14	400	27	14	400	27	14	389	27
						15	470	28	15	425	27
						16	550	30	16	425	26
						17	444	28	17	396	27
									18	478	29
Mean	555	29		523	29		501	29		495	28
S.D.	135.7	2.2		119.1	2.1		103.5	2.0		122.7	1.8
Min	352	24		342	25		400	25		368	26
Max	847	31		750	32		813	33		845	34
N	12	12		14	14		17	17		18	18

TABLE A55-5. (CONTINUED) - 5% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 27 (DEN) Males			Tank 27 (DEN) Females			Tank 28 (DEN) Males			Tank 28 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	712	32	1	718	32	1	469	28	1	442	29
2	432	28	2	314	24	2	599	32	2	491	30
3	471	28	3	598	29	3	473	29	3	656	32
4	398	27	4	514	29	4	460	28	4	429	29
5	503	25	5	522	28	5	654	31	5	319	26
6	303	26	6	532	31	6	557	29	6	752	35
7	480	29	7	361	26	7	552	30	7	806	35
8	357	26	8	404	28	8	666	32	8	613	29
9	481	31	9	429	27	9	397	28	9	534	30
10	761	31	10	250	26	10	599	31	10	544	30
11	341	26	11	443	29	11	622	31	11	433	27
12	425	27	12	704	31	12	370	26	12	568	31
13	429	27	13	653	32	13	501	31			
14	410	29	14	462	28	14	447	28			
15	457	28	15	518	29	15	383	28			
			16	496	29	16	504	29			
			17	478	29	17	340	27			
			18	557	29	18	473	29			
			19	279	23	19	376	27			
						20	445	27			
Mean	464	28		486	28		494	29		549	30
S.D.	124.0	2.1		130.9	2.4		98.2	1.8		141.1	2.7
Min	303	25		250	23		340	26		319	26
Max	761	32		718	32		666	32		806	35
N	15	15		19	19		20	20		12	12

TABLE A55-5. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 29 Males			Tank 29 Females			Tank 30 Males			Tank 30 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	489	29	1	607	29	1	517	29	1	514	29
2	649	30	2	687	31	2	486	28	2	434	27
3	542	28	3	409	27	3	411	27	3	388	26
4	674	31	4	451	27	4	650	32	4	795	30
5	370	27	5	463	26	5	541	28	5	795	33
6	654	33	6	422	28	6	651	30	6	499	28
7	433	26	7	647	27	7	437	26	7	539	29
8	559	31	8	366	26	8	384	27	8	764	31
9	630	31	9	736	30	9	589	30	9	523	29
10	635	32	10	357	27	10	900	32	10	351	24
11	490	28	11	532	30	11	544	30	11	418	27
12	679	31	12	495	30	12	369	26	12	537	29
13	389	26	13	386	26	13	530	30	13	416	29
14	396	27	14	498	30	14	472	28			
						15	276	24			
						16	370	27			
Mean	542	29		504	28		508	28		536	29
S.D.	113.9	2.3		122.2	1.8		147.8	2.2		153.6	2.3
Min	370	26		357	26		276	24		351	24
Max	679	33		736	31		900	32		795	33
N	14	14		14	14		16	16		13	13

TABLE A55-5. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

Tank 31 (DEN) Males			Tank 31 (DEN) Females			Tank 32 (DEN) Males			Tank 32 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	813	34	1	536	29	1	628	31	1	808	32
2	497	27	2	719	31	2	495	28	2	763	31
3	652	33	3	1047	35	3	542	29	3	923	34
4	405	28	4	721	30	4	486	26	4	667	28
5	670	30	5	536	29	5	630	31	5	313	27
6	547	29	6	461	27	6	534	30	6	537	30
7	643	30	7	525	27	7	562	30	7	572	28
8	395	26	8	596	28	8	500	30	8	598	26
9	404	28	9	795	28	9	288	24	9	572	30
10	480	29	10	445	27	10	506	31	10	315	23
11	391	27	11	690	31	11	561	30	11	491	23
12	574	30	12	533	32	12	500	29	12	468	29
13	559	30	13	516	28	13	426	27	13	607	30
14	437	27	14	495	27				14	629	30
15	392	25							15	426	27
16	615	30							16	495	27
									17	546	30
									18	370	26
									19	831	34
									20	512	30
									21	341	25
									22	450	28
									23	604	29
									24	505	29

TABLE A55-5. (CONTINUED) - 25% GROUNDWATER BY VOLUME DILUTED WITH APG-EA TAP WATER

	Tank 31 (DEN) Males			Tank 31 (DEN) Females			Tank 32 (DEN) Males			Tank 32 (DEN) Females	
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
Mean	530	29		615	29		512	29		556	29
S.D.	126.0	2.4		164.4	2.4		87.8	2.1		159.9	2.8
Min	391	25		445	27		288	24		313	23
Max	813	34		1047	35		630	31		923	34
N	16	16		14	14		13	13		24	24

TABLE A55-6. NINE-MONTH GROWTH DATA OF JAPANESE MEDAKA DURING THE CHRONIC HISTOPATHOLOGY EXPOSURE STUDY (SACRIFICED MAY 12, 1995; TEST DAY 272) - CEHR CONTROL FISH

Tank 33 Males			Tank 33 Females			Tank 34 Males			Tank 34 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	560	31	1	437	27	1	492	27	1	578	31
2	430	27	2	158	22	2	302	24	2	321	23
3	590	31	3	394	23	3	419	26	3	303	25
4	229	23	4	286	24	4	399	25	4	363	26
5	451	27	5	364	26	5	303	24	5	326	24
6	397	26	6	436	26	6	425	25	6	394	28
7	309	26	7	458	30	7	658	29	7	345	26
8	304	23	8	490	27	8	356	25	8	293	23
9	346	25	9	266	25	9	217	23	9	358	28
10	362	27	10	301	25	10	420	28	10	313	25
11	411	25	11	357	26	11	480	28	11	467	29
12	515	28	12	444	28	12	275	24	12	338	24
13	539	27	13	567	27	13	393	24	13	475	29
14	384	26	14	366	28	14	266	24	14	442	27
15	264	23	15	367	26				15	422	28
16	374	26	16	328	26				16	485	27
17	383	27	17	200	23				17	399	26
18	545	29	18	406	27				18	502	28
19	271	23							19	299	23
									20	314	27
									21	390	27
									22	542	28
									23	306	24
									24	289	24
									25	370	25

TABLE A55-6. (CONTINUED) - CEHR CONTROL FISH

Tank 33 Males			Tank 33 Females			Tank 34 Males			Tank 34 Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
Mean	403	26		368	26		386	25		385	26
S.D.	107.0	2.4		101.6	2.0		113.7	1.9		83.3	2.2
Min	229	23		158	22		217	23		289	23
Max	590	31		567	30		658	29		578	31
N	19	19		18	18		14	14		25	25

TABLE A55-6. (CONTINUED) - CEHR CONTROL FISH

Tank 35 (DEN) Males			Tank 35 (DEN) Females			Tank 36 (DEN) Males			Tank 36 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
1	327	24	1	417	27	1	439	27	1	315	26
2	574	30	2	345	25	2	383	26	2	388	27
3	356	25	3	212	23	3	402	28	3	495	30
4	577	31	4	290	24	4	389	26	4	330	26
5	727	32	5	233	26	5	357	27	5	440	29
6	423	26	6	215	24	6	500	30	6	224	22
7	438	27	7	287	25	7	319	24	7	364	25
8	412	25	8	326	24	8	358	26	8	396	25
9	180	22	9	241	25	9	238	21	9	337	26
10	541	30	10	274	23	10	388	27	10	404	28
11	461	29	11	281	22	11	241	22	11	348	26
12	466	29	12	353	23	12	287	22	12	285	21
13	419	28	13	268	24	13	288	24	13	485	30
14	403	25	14	268	23	14	276	23	14	314	24
15	435	27				15	412	24	15	512	29
16	294	26				16	244	22	16	339	26
17	576	29				17	231	22	17	343	24
18	451	29				18	255	23	18	402	24
19	454	26							19	242	22
20	365	28							20	334	24
21	327	23									
22	300	23									

TABLE A55-6. (CONTINUED) - CEHR CONTROL FISH

Tank 35 (DEN) Males			Tank 35 (DEN) Females			Tank 36 (DEN) Males			Tank 36 (DEN) Females		
Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)	Fish No.	Wet Weight (mg)	Standard Length (mm)
Mean	432	27		286	24		334	25		365	26
S.D.	119.0	2.7		57.5	1.4		80.2	2.5		77.4	2.6
Min	180	22		212	22		231	21		224	21
Max	727	32		417	27		500	30		512	30
N	22	22		14	14		18	18		20	20

APPENDIX 56

SUMMARY OF THE STATISTICAL ANALYSES OF GROWTH FOR THE SIX-MONTH INTERIM AND NINE-MONTH FINAL JAPANESE MEDAKA IN THE CHRONIC HISTOPATHOLOGY STUDY

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	3	apg creek mo33
CONC	4	0 1 5 25
TANK	36	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
CAN_AGT	2	DEN NONE
SEX	2	F M

Number of observations in by group = 710

Analysis of Medaka growth data
Analysis to compare Ft. Detrick controls to others
10:47 Tuesday, February 25, 1997

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	53	2916190.9574	55022.4709	9.44	0.0001
Error	656	3825024.6257	5830.8302		
Corrected Total	709	6741215.5831			

R-Square	C.V.	Root MSE	WGT Mean
0.432591	20.81098	76.359873	366.92113

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	2533103.6713	149006.0983	25.55	0.0001
TANK(DILU*CONC*CAN_)	18	210648.4801	11702.6933	2.01	0.0080
SEX	1	1137.5979	1137.5979	0.20	0.6589
DILUE*CONC*CAN_A*SEX	17	171301.2082	10076.5417	1.73	0.0339

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	2512515.5862	147795.0345	25.35	0.0001
TANK(DILU*CONC*CAN_)	18	228302.0310	12683.4462	2.18	0.0033
SEX	1	856.6044	856.6044	0.15	0.7016
DILUE*CONC*CAN_A*SEX	17	171301.2082	10076.5417	1.73	0.0339

Parameter	Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
APG vs Ft. Detrick	703.117037	16.59	0.0001	42.3881163

----------------------------------- MONTH=6 -----------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	53	2021.2475080	38.1367454	8.01	0.0001
Error	656	3124.8384075	4.7634732		
Corrected Total	709	5146.0859155			

R-Square	C.V.	Root MSE	LEN Mean
0.392774	8.263223	2.1825382	26.412676

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	1703.2682029	100.1922472	21.03	0.0001
TANK(DILU*CONC*CAN_)	18	200.0043040	11.1113502	2.33	0.0014
SEX	1	0.1015540	0.1015540	0.02	0.8840
DILUE*CONC*CAN_A*SEX	17	117.8734470	6.9337322	1.46	0.1049

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	1717.0452641	101.0026626	21.20	0.0001
TANK(DILU*CONC*CAN_)	18	209.7900184	11.6550010	2.45	0.0008
SEX	1	0.0596685	0.0596685	0.01	0.9109
DILUE*CONC*CAN_A*SEX	17	117.8734470	6.9337322	1.46	0.1049

Parameter	Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
APG vs Ft. Detrick	16.6278607	13.72	0.0001	1.21154844

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	WGT LSMEAN	LSMEAN Number
apg	0	DEN	423.054997	1
apg	0	NONE	360.660428	2
apg	1	DEN	394.123396	3
apg	1	NONE	378.049490	4
apg	5	DEN	400.708333	5
apg	5	NONE	393.566316	6
apg	25	DEN	384.625000	7
apg	25	NONE	390.341038	8
creek	0	DEN	376.079070	9
creek	0	NONE	360.888846	10
creek	1	DEN	380.990894	11
creek	1	NONE	375.011364	12
creek	5	DEN	358.192931	13
creek	5	NONE	398.655688	14
creek	25	DEN	406.822268	15
creek	25	NONE	413.884231	16
mo33	0	DEN	191.433152	17
mo33	0	NONE	217.350000	18

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.0254	0.2804	0.0963	0.4001	0.2653	0.1504	0.2232	0.0813
2	0.0254	.	0.2079	0.5000	0.1344	0.2092	0.3542	0.2606	0.5460
3	0.2804	0.2079	.	0.5390	0.8025	0.9829	0.7149	0.8857	0.4875
4	0.0963	0.5000	0.5390	.	0.3876	0.5475	0.7975	0.6369	0.9383
5	0.4001	0.1344	0.8025	0.3876	.	0.7834	0.5366	0.6934	0.3448
6	0.2653	0.2092	0.9829	0.5475	0.7834	.	0.7274	0.9011	0.4949
7	0.1504	0.3542	0.7149	0.7975	0.5366	0.7274	.	0.8254	0.7368
8	0.2232	0.2606	0.8857	0.6369	0.6934	0.9011	0.8254	.	0.5812
9	0.0813	0.5460	0.4875	0.9383	0.3448	0.4949	0.7368	0.5812	.
10	0.0265	0.9929	0.2130	0.5077	0.1383	0.2145	0.3611	0.2664	0.5539
11	0.1202	0.4339	0.6169	0.9093	0.4534	0.6272	0.8877	0.7206	0.8479
12	0.0769	0.5763	0.4653	0.9056	0.3278	0.4722	0.7073	0.5560	0.9665
13	0.0222	0.9241	0.1830	0.4479	0.1177	0.1839	0.3142	0.2301	0.4901
14	0.3550	0.1507	0.8621	0.4272	0.9371	0.8432	0.5860	0.7495	0.3813
15	0.5403	0.0884	0.6314	0.2771	0.8164	0.6119	0.3975	0.5334	0.2429
16	0.7256	0.0501	0.4527	0.1752	0.6140	0.4341	0.2631	0.3713	0.1506
17	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
18	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC*CAN_AGT
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16	17	18
1	0.0265	0.1202	0.0769	0.0222	0.3550	0.5403	0.7256	0.0001	0.0001
2	0.9929	0.4339	0.5763	0.9241	0.1507	0.0884	0.0501	0.0001	0.0001
3	0.2130	0.6169	0.4653	0.1830	0.8621	0.6314	0.4527	0.0001	0.0001
4	0.5077	0.9093	0.9056	0.4479	0.4272	0.2771	0.1752	0.0001	0.0001
5	0.1383	0.4534	0.3278	0.1177	0.9371	0.8164	0.6140	0.0001	0.0001
6	0.2145	0.6272	0.4722	0.1839	0.8432	0.6119	0.4341	0.0001	0.0001
7	0.3611	0.8877	0.7073	0.3142	0.5860	0.3975	0.2631	0.0001	0.0001
8	0.2664	0.7206	0.5560	0.2301	0.7495	0.5334	0.3713	0.0001	0.0001
9	0.5539	0.8479	0.9665	0.4901	0.3813	0.2429	0.1506	0.0001	0.0001
10	.	0.4413	0.5842	0.9175	0.1550	0.0913	0.0520	0.0001	0.0001
11	0.4413	.	0.8165	0.3873	0.4973	0.3301	0.2139	0.0001	0.0001
12	0.5842	0.8165	.	0.5187	0.3627	0.2304	0.1425	0.0001	0.0001
13	0.9175	0.3873	0.5187	.	0.1320	0.0773	0.0437	0.0001	0.0001
14	0.1550	0.4973	0.3627	0.1320	.	0.7545	0.5570	0.0001	0.0001
15	0.0913	0.3301	0.2304	0.0773	0.7545	.	0.7870	0.0001	0.0001
16	0.0520	0.2139	0.1425	0.0437	0.5570	0.7870	.	0.0001	0.0001
17	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	.	0.3245
18	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.3245	.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
apg	0	DEN	28.9917209	1
apg	0	NONE	26.3362299	2
apg	1	DEN	27.2307487	3
apg	1	NONE	27.3255102	4
apg	5	DEN	28.3222222	5
apg	5	NONE	27.9368421	6
apg	25	DEN	27.0750000	7
apg	25	NONE	27.9246088	8
creek	0	DEN	26.9941860	9
creek	0	NONE	26.0807692	10
creek	1	DEN	25.8167770	11
creek	1	NONE	26.1136364	12
creek	5	DEN	25.5550796	13
creek	5	NONE	26.3784098	14
creek	25	DEN	25.4334699	15

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
creek	25	NONE	26.1703846	16
mo33	0	DEN	22.1125227	17
mo33	0	NONE	23.7750000	18

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.0030	0.0384	0.0460	0.4055	0.1917	0.0237	0.1914	0.0185
2	0.0030	.	0.2644	0.2128	0.0195	0.0511	0.3463	0.0551	0.3977
3	0.0384	0.2644	.	0.9044	0.1821	0.3761	0.8432	0.3893	0.7627
4	0.0460	0.2128	0.9044	.	0.2152	0.4360	0.7472	0.4501	0.6684
5	0.4055	0.0195	0.1821	0.2152	.	0.6254	0.1244	0.6184	0.1015
6	0.1917	0.0511	0.3761	0.4360	0.6254	.	0.2749	0.9876	0.2313
7	0.0237	0.3463	0.8432	0.7472	0.1244	0.2749	.	0.2868	0.9164
8	0.1914	0.0551	0.3893	0.4501	0.6184	0.9876	0.2868	.	0.2423
9	0.0185	0.3977	0.7627	0.6684	0.1015	0.2313	0.9164	0.2423	.
10	0.0015	0.7433	0.1578	0.1232	0.0100	0.0268	0.2117	0.0292	0.2470
11	0.0007	0.5085	0.0873	0.0662	0.0048	0.0132	0.1194	0.0146	0.1412
12	0.0016	0.7742	0.1674	0.1310	0.0106	0.0285	0.2243	0.0311	0.2614
13	0.0004	0.3265	0.0472	0.0349	0.0024	0.0066	0.0652	0.0073	0.0778
14	0.0035	0.9568	0.2886	0.2339	0.0223	0.0578	0.3757	0.0622	0.4299
15	0.0003	0.2604	0.0351	0.0257	0.0017	0.0048	0.0487	0.0053	0.0583
16	0.0020	0.8315	0.1910	0.1508	0.0128	0.0340	0.2540	0.0369	0.2947
17	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
18	0.0001	0.0035	0.0003	0.0002	0.0001	0.0001	0.0004	0.0001	0.0005

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.0015	0.0007	0.0016	0.0004	0.0035	0.0003	0.0020	0.0001	0.0001
2	0.7433	0.5085	0.7742	0.3265	0.9568	0.2604	0.8315	0.0001	0.0035
3	0.1578	0.0873	0.1674	0.0472	0.2886	0.0351	0.1910	0.0001	0.0003
4	0.1232	0.0662	0.1310	0.0349	0.2339	0.0257	0.1508	0.0001	0.0002
5	0.0100	0.0048	0.0106	0.0024	0.0223	0.0017	0.0128	0.0001	0.0001
6	0.0268	0.0132	0.0285	0.0066	0.0578	0.0048	0.0340	0.0001	0.0001
7	0.2117	0.1194	0.2243	0.0652	0.3757	0.0487	0.2540	0.0001	0.0004
8	0.0292	0.0146	0.0311	0.0073	0.0622	0.0053	0.0369	0.0001	0.0001
9	0.2470	0.1412	0.2614	0.0778	0.4299	0.0583	0.2947	0.0001	0.0005
10	.	0.7369	0.9663	0.5080	0.7041	0.4178	0.9089	0.0001	0.0076
11	0.7369	.	0.7044	0.7411	0.4768	0.6301	0.6532	0.0002	0.0162

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC*CAN_AGT
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	10	11	12	13	14	15	16	17	18
12	0.9663	0.7044	.	0.4800	0.7341	0.3928	0.9419	0.0001	0.0067
13	0.5080	0.7411	0.4800	.	0.3036	0.8789	0.4395	0.0004	0.0336
14	0.7041	0.4768	0.7341	0.3036	.	0.2413	0.7905	0.0001	0.0032
15	0.4178	0.6301	0.3928	0.8789	0.2413	.	0.3577	0.0005	0.0466
16	0.9089	0.6532	0.9419	0.4395	0.7905	0.3577	.	0.0001	0.0059
17	0.0001	0.0002	0.0001	0.0004	0.0001	0.0005	0.0001	.	0.0460
18	0.0076	0.0162	0.0067	0.0336	0.0032	0.0466	0.0059	0.0460	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	3	apg creek mo33
CONC	4	0 1 5 25
TANK	36	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
CAN_AGT	2	DEN NONE
SEX	2	F M

Number of observations in by group = 1016

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	53	4174683.8588	78767.6200	6.20	0.0001
Error	962	12219827.8893	12702.5238		
Corrected Total	1015	16394511.7480			

R-Square	C.V.	Root MSE	WGT Mean
0.254639	23.47954	112.70547	480.01575

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	3028331.5397	178137.1494	14.02	0.0001
TANK(DILU*CONC*CAN_)	18	353407.1784	19633.7321	1.55	0.0675
SEX	1	278721.6788	278721.6788	21.94	0.0001
DILUE*CONC*CAN_A*SEX	17	514223.4619	30248.4389	2.38	0.0013

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	2994797.4915	176164.5583	13.87	0.0001
TANK(DILU*CONC*CAN_)	18	416588.6675	23143.8149	1.82	0.0191
SEX	1	414434.2260	414434.2260	32.63	0.0001
DILUE*CONC*CAN_A*SEX	17	514223.4619	30248.4389	2.38	0.0013

Parameter	Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
APG vs Ft. Detrick	445.533426	9.14	0.0001	48.7201562

Analysis of Medaka growth data
Analysis to compare Ft. Detrick controls to others
10:47 Tuesday, February 25, 1997

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	53	1509.5552479	28.4821745	6.54	0.0001
Error	962	4190.8847128	4.3564290		
Corrected Total	1015	5700.4399606			

R-Square	C.V.	Root MSE	LEN Mean
0.264814	7.467695	2.0872060	27.949803

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	1078.5897698	63.4464570	14.56	0.0001
TANK(DILU*CONC*CAN_)	18	153.3459930	8.5192218	1.96	0.0099
SEX	1	90.6335790	90.6335790	20.80	0.0001
DILUE*CONC*CAN_A*SEX	17	186.9859061	10.9991709	2.52	0.0006

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT*CONC*CAN_AGT	17	1062.9390551	62.5258268	14.35	0.0001
TANK(DILU*CONC*CAN_)	18	177.8810799	9.8822822	2.27	0.0019
SEX	1	136.6887891	136.6887891	31.38	0.0001
DILUE*CONC*CAN_A*SEX	17	186.9859061	10.9991709	2.52	0.0006

Parameter	Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
APG vs Ft. Detrick	9.20093136	10.20	0.0001	0.90225435

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	WGT LSMEAN	LSMEAN Number
apg	0	DEN	560.671358	1
apg	0	NONE	467.607945	2
apg	1	DEN	497.272936	3
apg	1	NONE	520.224317	4
apg	5	DEN	496.758854	5
apg	5	NONE	518.491544	6
apg	25	DEN	551.439483	7
apg	25	NONE	521.748697	8
creek	0	DEN	441.114790	9
creek	0	NONE	471.348649	10
creek	1	DEN	474.917072	11
creek	1	NONE	482.686697	12
creek	5	DEN	444.281560	13
creek	5	NONE	462.014035	14
creek	25	DEN	536.514469	15
creek	25	NONE	496.180148	16
mo33	0	DEN	360.537707	17
mo33	0	NONE	387.066951	18

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.0029	0.0356	0.1797	0.0324	0.1523	0.7418	0.1895	0.0010
2	0.0029	.	0.2748	0.0713	0.2764	0.0724	0.0047	0.0602	0.3765
3	0.0356	0.2748	.	0.4287	0.9850	0.4516	0.0596	0.3920	0.0780
4	0.1797	0.0713	0.4287	.	0.4131	0.9524	0.2802	0.9586	0.0202
5	0.0324	0.2764	0.9850	0.4131	.	0.4352	0.0545	0.3766	0.0777
6	0.1523	0.0724	0.4516	0.9524	0.4352	.	0.2424	0.9094	0.0201
7	0.7418	0.0047	0.0596	0.2802	0.0545	0.2424	.	0.2961	0.0016
8	0.1895	0.0602	0.3920	0.9586	0.3766	0.9094	0.2961	.	0.0169
9	0.0010	0.3765	0.0780	0.0202	0.0777	0.0201	0.0016	0.0169	.
10	0.0102	0.9013	0.4076	0.1386	0.4120	0.1439	0.0165	0.1230	0.3729
11	0.0191	0.8219	0.5036	0.1951	0.5097	0.2035	0.0301	0.1766	0.3485
12	0.0182	0.6042	0.6262	0.2334	0.6346	0.2440	0.0298	0.2098	0.2108
13	0.0018	0.4529	0.1068	0.0297	0.1067	0.0300	0.0028	0.0254	0.9261
14	0.0034	0.8424	0.2336	0.0652	0.2349	0.0664	0.0054	0.0558	0.5125
15	0.4506	0.0335	0.2180	0.6137	0.2079	0.5685	0.6300	0.6430	0.0102
16	0.0452	0.3294	0.9707	0.4388	0.9843	0.4615	0.0733	0.4046	0.1021
17	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0127
18	0.0001	0.0049	0.0005	0.0001	0.0005	0.0001	0.0001	0.0001	0.0789

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC*CAN_AGT
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16	17	18
1	0.0102	0.0191	0.0182	0.0018	0.0034	0.4506	0.0452	0.0001	0.0001
2	0.9013	0.8219	0.6042	0.4529	0.8424	0.0335	0.3294	0.0005	0.0049
3	0.4076	0.5036	0.6262	0.1068	0.2336	0.2180	0.9707	0.0001	0.0005
4	0.1386	0.1951	0.2334	0.0297	0.0652	0.6137	0.4388	0.0001	0.0001
5	0.4120	0.5097	0.6346	0.1067	0.2349	0.2079	0.9843	0.0001	0.0005
6	0.1439	0.2035	0.2440	0.0300	0.0664	0.5685	0.4615	0.0001	0.0001
7	0.0165	0.0301	0.0298	0.0028	0.0054	0.6300	0.0733	0.0001	0.0001
8	0.1230	0.1766	0.2098	0.0254	0.0558	0.6430	0.4046	0.0001	0.0001
9	0.3729	0.3485	0.2108	0.9261	0.5125	0.0102	0.1021	0.0127	0.0789
10	.	0.9212	0.7314	0.4382	0.7723	0.0691	0.4541	0.0015	0.0106
11	0.9212	.	0.8248	0.4074	0.7078	0.1017	0.5457	0.0021	0.0128
12	0.7314	0.8248	.	0.2614	0.5090	0.1169	0.6723	0.0004	0.0034
13	0.4382	0.4074	0.2614	.	0.5908	0.0150	0.1339	0.0128	0.0744
14	0.7723	0.7078	0.5090	0.5908	.	0.0315	0.2790	0.0017	0.0139
15	0.0691	0.1017	0.1169	0.0150	0.0315	.	0.2321	0.0001	0.0001
16	0.4541	0.5457	0.6723	0.1339	0.2790	0.2321	.	0.0002	0.0012
17	0.0015	0.0021	0.0004	0.0128	0.0017	0.0001	0.0002	.	0.3027
18	0.0106	0.0128	0.0034	0.0744	0.0139	0.0001	0.0012	0.3027	.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
apg	0	DEN	28.9046071	1
apg	0	NONE	28.2325818	2
apg	1	DEN	28.5573394	3
apg	1	NONE	28.6442036	4
apg	5	DEN	28.8781250	5
apg	5	NONE	28.6251084	6
apg	25	DEN	28.8875793	7
apg	25	NONE	28.5688217	8
creek	0	DEN	27.3545792	9
creek	0	NONE	27.7500000	10
creek	1	DEN	27.4268045	11
creek	1	NONE	28.0674462	12
creek	5	DEN	27.3762399	13
creek	5	NONE	28.0188596	14
creek	25	DEN	28.8678843	15

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
creek	25	NONE	28.1820741	16
mo33	0	DEN	25.5152449	17
mo33	0	NONE	26.0051735	18

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2441	0.5546	0.6687	0.9634	0.6375	0.9765	0.5762	0.0249
2	0.2441	.	0.5581	0.4775	0.2446	0.4853	0.2385	0.5543	0.1631
3	0.5546	0.5581	.	0.8838	0.5712	0.9067	0.5604	0.9843	0.0686
4	0.6687	0.4775	0.8838	.	0.6908	0.9746	0.6794	0.9012	0.0596
5	0.9634	0.2446	0.5712	0.6908	.	0.6583	0.9865	0.5938	0.0233
6	0.6375	0.4853	0.9067	0.9746	0.6583	.	0.6468	0.9242	0.0578
7	0.9765	0.2385	0.5604	0.6794	0.9865	0.6468	.	0.5830	0.0226
8	0.5762	0.5543	0.9843	0.9012	0.5938	0.9242	0.5830	.	0.0712
9	0.0249	0.1631	0.0686	0.0596	0.0233	0.0578	0.0226	0.0712	.
10	0.0897	0.4426	0.2175	0.1869	0.0879	0.1867	0.0858	0.2195	0.5702
11	0.0456	0.2386	0.1122	0.0972	0.0442	0.0961	0.0431	0.1143	0.9218
12	0.1941	0.7829	0.4310	0.3713	0.1944	0.3759	0.1899	0.4297	0.2958
13	0.0318	0.1897	0.0837	0.0725	0.0303	0.0709	0.0295	0.0860	0.9755
14	0.1597	0.7135	0.3743	0.3208	0.1586	0.3236	0.1547	0.3744	0.3177
15	0.9554	0.3179	0.6309	0.7368	0.9872	0.7094	0.9754	0.6495	0.0409
16	0.2584	0.9326	0.5439	0.4710	0.2611	0.4789	0.2553	0.5400	0.2264
17	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0068
18	0.0001	0.0004	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0371

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.0897	0.0456	0.1941	0.0318	0.1597	0.9554	0.2584	0.0001	0.0001
2	0.4426	0.2386	0.7829	0.1897	0.7135	0.3179	0.9326	0.0001	0.0004
3	0.2175	0.1122	0.4310	0.0837	0.3743	0.6309	0.5439	0.0001	0.0002
4	0.1869	0.0972	0.3713	0.0725	0.3208	0.7368	0.4710	0.0001	0.0002
5	0.0879	0.0442	0.1944	0.0303	0.1586	0.9872	0.2611	0.0001	0.0001
6	0.1867	0.0961	0.3759	0.0709	0.3236	0.7094	0.4789	0.0001	0.0001
7	0.0858	0.0431	0.1899	0.0295	0.1547	0.9754	0.2553	0.0001	0.0001
8	0.2195	0.1143	0.4297	0.0860	0.3744	0.6495	0.5400	0.0001	0.0002
9	0.5702	0.9218	0.2958	0.9755	0.3177	0.0409	0.2264	0.0068	0.0371
10	.	0.6653	0.6423	0.6027	0.6870	0.1260	0.5275	0.0018	0.0104
11	0.6653	.	0.3819	0.9467	0.4089	0.0666	0.3037	0.0095	0.0442

MONTH=9

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC*CAN_AGT
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	10	11	12	13	14	15	16	17	18
12	0.6423	0.3819	.	0.3260	0.9398	0.2514	0.8617	0.0004	0.0025
13	0.6027	0.9467	0.3260	.	0.3497	0.0496	0.2535	0.0082	0.0414
14	0.6870	0.4089	0.9398	0.3497	.	0.2146	0.7993	0.0004	0.0023
15	0.1260	0.0666	0.2514	0.0496	0.2146	.	0.3224	0.0001	0.0002
16	0.5275	0.3037	0.8617	0.2535	0.7993	0.3224	.	0.0002	0.0016
17	0.0018	0.0095	0.0004	0.0082	0.0004	0.0001	0.0002	.	0.3556
18	0.0104	0.0442	0.0025	0.0414	0.0023	0.0002	0.0016	0.3556	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	2	apg creek
CONC	4	0 1 5 25
TANK	32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
CAN_AGT	2	DEN NONE
SEX	2	F M

Number of observations in by group = 64

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	47	60254.748338	1282.015922	1.52	0.1797
Error	16	13457.685256	841.105328		
Corrected Total	63	73712.433594			

R-Square	C.V.	Root MSE	WGT Mean
0.817430	7.496208	29.001816	386.88648

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	325.505378	325.505378	0.39	0.5426
CONC	3	4077.319723	1359.106574	1.62	0.2251
CAN_AGT	1	1085.837076	1085.837076	1.29	0.2726
DILUENT*CONC	3	5148.750161	1716.250054	2.04	0.1487
DILUENT*CAN_AGT	1	3355.828097	3355.828097	3.99	0.0631
CONC*CAN_AGT	3	7542.213089	2514.071030	2.99	0.0621
DILUENT*CONC*CAN_AGT	3	2495.521557	831.840519	0.99	0.4229
TANK(DILU*CONC*CAN_)	16	18762.559752	1172.659985	1.39	0.2569
SEX	1	197.856093	197.856093	0.24	0.6342
DILUENT*SEX	1	5771.341152	5771.341152	6.86	0.0186
CONC*SEX	3	6503.259488	2167.753163	2.58	0.0899
CAN_AGT*SEX	1	556.866337	556.866337	0.66	0.4278
DILUENT*CONC*SEX	3	965.380526	321.793509	0.38	0.7669
DILUENT*CAN_AGT*SEX	1	432.639841	432.639841	0.51	0.4836
CONC*CAN_AGT*SEX	3	2843.613273	947.871091	1.13	0.3678
DILUE*CONC*CAN_A*SEX	3	190.256794	63.418931	0.08	0.9724

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	325.505378	325.505378	0.39	0.5426
CONC	3	4077.319723	1359.106574	1.62	0.2251
CAN_AGT	1	1085.837076	1085.837076	1.29	0.2726
DILUENT*CONC	3	5148.750161	1716.250054	2.04	0.1487
DILUENT*CAN_AGT	1	3355.828097	3355.828097	3.99	0.0631
CONC*CAN_AGT	3	7542.213089	2514.071030	2.99	0.0621
DILUENT*CONC*CAN_AGT	3	2495.521557	831.840519	0.99	0.4229
TANK(DILU*CONC*CAN_)	16	18762.559752	1172.659985	1.39	0.2569
SEX	1	197.856093	197.856093	0.24	0.6342
DILUENT*SEX	1	5771.341152	5771.341152	6.86	0.0186

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Type III SS	Mean Square	F Value	Pr > F
CONC*SEX	3	6503.259488	2167.753163	2.58	0.0899
CAN_AGT*SEX	1	556.866337	556.866337	0.66	0.4278
DILUENT*CONC*SEX	3	965.380526	321.793509	0.38	0.7669
DILUENT*CAN_AGT*SEX	1	432.639841	432.639841	0.51	0.4836
CONC*CAN_AGT*SEX	3	2843.613273	947.871091	1.13	0.3678
DILUE*CONC*CAN_A*SEX	3	190.256794	63.418931	0.08	0.9724

Tests of Hypotheses using the Type III MS for
TANK(DILU*CONC*CAN_) as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	325.5053784	325.5053784	0.28	0.6055
CONC	3	4077.3197235	1359.1065745	1.16	0.3560
CAN_AGT	1	1085.8370756	1085.8370756	0.93	0.3502
DILUENT*CONC	3	5148.7501605	1716.2500535	1.46	0.2619
DILUENT*CAN_AGT	1	3355.8280971	3355.8280971	2.86	0.1101
CONC*CAN_AGT	3	7542.2130892	2514.0710297	2.14	0.1347
DILUENT*CONC*CAN_AGT	3	2495.5215574	831.8405191	0.71	0.5604

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	47	89.90957918	1.91296977	3.69	0.0031
Error	16	8.29216120	0.51826007		
Corrected Total	63	98.20174038			

R-Square	C.V.	Root MSE	LEN Mean
0.915560	2.682386	0.7199028	26.838153

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	38.62475819	38.62475819	74.53	0.0001
CONC	3	2.46907032	0.82302344	1.59	0.2314
CAN_AGT	1	0.64332376	0.64332376	1.24	0.2817
DILUENT*CONC	3	3.06267029	1.02089010	1.97	0.1592
DILUENT*CAN_AGT	1	2.22611994	2.22611994	4.30	0.0547
CONC*CAN_AGT	3	15.28379410	5.09459803	9.83	0.0006
DILUENT*CONC*CAN_AGT	3	2.60930979	0.86976993	1.68	0.2116
TANK(DILU*CONC*CAN_)	16	13.13362256	0.82085141	1.58	0.1836
SEX	1	0.00489240	0.00489240	0.01	0.9238
DILUENT*SEX	1	0.86324047	0.86324047	1.67	0.2152
CONC*SEX	3	2.27033320	0.75677773	1.46	0.2628
CAN_AGT*SEX	1	0.70848278	0.70848278	1.37	0.2594
DILUENT*CONC*SEX	3	0.85735716	0.28578572	0.55	0.6545
DILUENT*CAN_AGT*SEX	1	0.47631247	0.47631247	0.92	0.3520
CONC*CAN_AGT*SEX	3	5.03840722	1.67946907	3.24	0.0499
DILUE*CONC*CAN_A*SEX	3	1.63788456	0.54596152	1.05	0.3962

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	38.62475819	38.62475819	74.53	0.0001
CONC	3	2.46907032	0.82302344	1.59	0.2314
CAN_AGT	1	0.64332376	0.64332376	1.24	0.2817
DILUENT*CONC	3	3.06267029	1.02089010	1.97	0.1592
DILUENT*CAN_AGT	1	2.22611994	2.22611994	4.30	0.0547
CONC*CAN_AGT	3	15.28379410	5.09459803	9.83	0.0006
DILUENT*CONC*CAN_AGT	3	2.60930979	0.86976993	1.68	0.2116
TANK(DILU*CONC*CAN_)	16	13.13362256	0.82085141	1.58	0.1836
SEX	1	0.00489240	0.00489240	0.01	0.9238
DILUENT*SEX	1	0.86324047	0.86324047	1.67	0.2152

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Type III SS	Mean Square	F Value	Pr > F
CONC*SEX	3	2.27033320	0.75677773	1.46	0.2628
CAN_AGT*SEX	1	0.70848278	0.70848278	1.37	0.2594
DILUENT*CONC*SEX	3	0.85735716	0.28578572	0.55	0.6545
DILUENT*CAN_AGT*SEX	1	0.47631247	0.47631247	0.92	0.3520
CONC*CAN_AGT*SEX	3	5.03840722	1.67946907	3.24	0.0499
DILUE*CONC*CAN_A*SEX	3	1.63788456	0.54596152	1.05	0.3962

Tests of Hypotheses using the Type III MS for
TANK(DILU*CONC*CAN_) as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	38.62475819	38.62475819	47.05	0.0001
CONC	3	2.46907032	0.82302344	1.00	0.4171
CAN_AGT	1	0.64332376	0.64332376	0.78	0.3891
DILUENT*CONC	3	3.06267029	1.02089010	1.24	0.3268
DILUENT*CAN_AGT	1	2.22611994	2.22611994	2.71	0.1191
CONC*CAN_AGT	3	15.28379410	5.09459803	6.21	0.0053
DILUENT*CONC*CAN_AGT	3	2.60930979	0.86976993	1.06	0.3937

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	WGT LSMEAN	Pr > |T| HO: LSMEAN1=LSMEAN2
apg	389.141696	0.6055
creek	384.631254	

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	LEN LSMEAN	Pr > |T| HO: LSMEAN1=LSMEAN2
apg	27.6150131	0.0001
creek	26.0612926	

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	WGT LSMEAN	Pr > |T| HO: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
0	378.991386	1	.	0.8101	0.5305	0.1042
1	381.948605	2	0.8101	.	0.6967	0.1586
5	386.754097	3	0.5305	0.6967	.	0.2954
25	399.851812	4	0.1042	0.1586	0.2954	.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	LEN LSMEAN	Pr > |T| HO: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
0	27.0769713	1	.	0.1701	0.7766	0.2268
1	26.6167506	2	0.1701	.	0.2678	0.8596
5	26.9845448	3	0.7766	0.2678	.	0.3473
25	26.6743448	4	0.2268	0.8596	0.3473	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	WGT LSMEAN	LSMEAN Number
apg	0	389.542241	1
apg	1	384.240396	2
apg	5	395.289870	3
apg	25	387.494277	4
creek	0	368.440530	5
creek	1	379.656815	6
creek	5	378.218323	7
creek	25	412.209348	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.7608	0.7415	0.9063	0.2356	0.5717	0.5178	0.2042
2	0.7608	.	0.5279	0.8517	0.3698	0.7924	0.7296	0.1219
3	0.7415	0.5279	.	0.6550	0.1364	0.3748	0.3336	0.3378
4	0.9063	0.8517	0.6550	.	0.2822	0.6533	0.5955	0.1682
5	0.2356	0.3698	0.1364	0.2822	.	0.5217	0.5759	0.0211
6	0.5717	0.7924	0.3748	0.6533	0.5217	.	0.9341	0.0754
7	0.5178	0.7296	0.3336	0.5955	0.5759	0.9341	.	0.0645
8	0.2042	0.1219	0.3378	0.1682	0.0211	0.0754	0.0645	.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	LEN LSMEAN	LSMEAN Number
apg	0	27.6216509	1
apg	1	27.2344208	2
apg	5	28.0904734	3
apg	25	27.5135073	4
creek	0	26.5322917	5
creek	1	25.9990804	6
creek	5	25.8786162	7
creek	25	25.8351822	8

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
1	.	0.4053	0.3161	0.8143	0.0286	0.0025	0.0014	0.0012
2	0.4053	.	0.0771	0.5465	0.1407	0.0149	0.0086	0.0070
3	0.3161	0.0771	.	0.2210	0.0034	0.0003	0.0002	0.0001
4	0.8143	0.5465	0.2210	.	0.0458	0.0041	0.0024	0.0019
5	0.0286	0.1407	0.0034	0.0458	.	0.2564	0.1683	0.1434
6	0.0025	0.0149	0.0003	0.0041	0.2564	.	0.7937	0.7222
7	0.0014	0.0086	0.0002	0.0024	0.1683	0.7937	.	0.9248
8	0.0012	0.0070	0.0001	0.0019	0.1434	0.7222	0.9248	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	WGT LSMEAN	LSMEAN Number
0	DEN	399.643403	1
0	NONE	358.339369	2
1	DEN	388.295952	3
1	NONE	375.601259	4
5	DEN	378.569399	5
5	NONE	394.938794	6
25	DEN	397.513167	7
25	NONE	402.190457	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.0282	0.5169	0.1794	0.2362	0.7870	0.9025	0.8836
2	0.0282	.	0.0993	0.3284	0.2547	0.0483	0.0361	0.0209
3	0.5169	0.0993	.	0.4692	0.5779	0.7032	0.5978	0.4290
4	0.1794	0.3284	0.4692	.	0.8645	0.2754	0.2189	0.1400
5	0.2362	0.2547	0.5779	0.8645	.	0.3533	0.2849	0.1867
6	0.7870	0.0483	0.7032	0.2754	0.3533	.	0.8824	0.6775
7	0.9025	0.0361	0.5978	0.2189	0.2849	0.8824	.	0.7882

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8
8	0.8836	0.0209	0.4290	0.1400	0.1867	0.6775	0.7882	.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
0	DEN	27.9922033	1
0	NONE	26.1617393	2
1	DEN	26.5632402	3
1	NONE	26.6702610	4
5	DEN	26.9104347	5
5	NONE	27.0586549	6
25	DEN	26.2877706	7
25	NONE	27.0609189	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.0009	0.0061	0.0101	0.0296	0.0560	0.0017	0.0565
2	0.0009	.	0.3886	0.2782	0.1179	0.0652	0.7844	0.0646
3	0.0061	0.3886	.	0.8162	0.4546	0.2903	0.5517	0.2882
4	0.0101	0.2782	0.8162	.	0.6033	0.4039	0.4109	0.4012
5	0.0296	0.1179	0.4546	0.6033	.	0.7478	0.1882	0.7441
6	0.0560	0.0652	0.2903	0.4039	0.7478	.	0.1082	0.9961
7	0.0017	0.7844	0.5517	0.4109	0.1882	0.1082	.	0.1072
8	0.0565	0.0646	0.2882	0.4012	0.7441	0.9961	0.1072	.

NOTE: To ensure overall protection level, only probabilities associated with
pre-planned comparisons should be used.

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
apg	DEN	F	398.313740	1
apg	DEN	M	402.690040	2
apg	NONE	F	364.493849	3
apg	NONE	M	391.069155	4
creek	DEN	F	393.113258	5
creek	DEN	M	369.904884	6
creek	NONE	F	398.658120	7
creek	NONE	M	376.848755	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.8015	0.0658	0.6778	0.7652	0.1165	0.9842	0.2280
2	0.8015	.	0.0404	0.5070	0.5837	0.0736	0.8168	0.1507
3	0.0658	0.0404	.	0.1402	0.1141	0.7561	0.0633	0.4810
4	0.6778	0.5070	0.1402	.	0.9065	0.2343	0.6635	0.4185
5	0.7652	0.5837	0.1141	0.9065	.	0.1941	0.7503	0.3563
6	0.1165	0.0736	0.7561	0.2343	0.1941	.	0.1125	0.6904
7	0.9842	0.8168	0.0633	0.6635	0.7503	0.1125	.	0.2209
8	0.2280	0.1507	0.4810	0.4185	0.3563	0.6904	0.2209	.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
apg	DEN	F	27.9858631	1
apg	DEN	M	27.8176865	2
apg	NONE	F	27.0293727	3
apg	NONE	M	27.6271302	4
creek	DEN	F	26.1188763	5
creek	DEN	M	25.8312229	6
creek	NONE	F	26.2534722	7
creek	NONE	M	26.0415990	8

----------------------------------- MONTH=6 -----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
1	.	0.7153	0.0508	0.4400	0.0008	0.0002	0.0015	0.0006
2	0.7153	.	0.1010	0.6796	0.0017	0.0005	0.0033	0.0012
3	0.0508	0.1010	.	0.2056	0.0616	0.0177	0.1061	0.0445
4	0.4400	0.6796	0.2056	.	0.0042	0.0011	0.0079	0.0030
5	0.0008	0.0017	0.0616	0.0042	.	0.5344	0.7702	0.8667
6	0.0002	0.0005	0.0177	0.0011	0.5344	.	0.3651	0.6486
7	0.0015	0.0033	0.1061	0.0079	0.7702	0.3651	.	0.6463
8	0.0006	0.0012	0.0445	0.0030	0.8667	0.6486	0.6463	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
0	DEN	F	416.707260	1
0	DEN	M	382.579545	2
0	NONE	F	350.133013	3
0	NONE	M	366.545725	4
1	DEN	F	411.054563	5
1	DEN	M	365.537340	6
1	NONE	F	387.099840	7
1	NONE	M	364.102679	8
5	DEN	F	368.861616	9
5	DEN	M	388.277183	10
5	NONE	F	390.946581	11
5	NONE	M	398.931006	12
25	DEN	F	386.230556	13
25	DEN	M	408.795779	14
25	NONE	F	398.124504	15
25	NONE	M	406.256410	16

MONTH=6

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8	9
1	.	0.1779	0.0143	0.0548	0.8184	0.0506	0.2391	0.0452	0.0657
2	0.1779	.	0.1990	0.5173	0.2568	0.4917	0.8543	0.4565	0.5789
3	0.0143	0.1990	.	0.5076	0.0229	0.5337	0.1464	0.5720	0.4505
4	0.0548	0.5173	0.5076	.	0.0847	0.9673	0.4085	0.9209	0.9250
5	0.8184	0.2568	0.0229	0.0847	.	0.0785	0.3373	0.0703	0.1006
6	0.0506	0.4917	0.5337	0.9673	0.0785	.	0.3864	0.9535	0.8925
7	0.2391	0.8543	0.1464	0.4085	0.3373	0.3864	.	0.3564	0.4623
8	0.0452	0.4565	0.5720	0.9209	0.0703	0.9535	0.3564	.	0.8467
9	0.0657	0.5789	0.4505	0.9250	0.1006	0.8925	0.4623	0.8467	.
10	0.2575	0.8170	0.1348	0.3828	0.3609	0.3616	0.9618	0.3330	0.4344
11	0.3032	0.7342	0.1113	0.3286	0.4185	0.3096	0.8758	0.2840	0.3753
12	0.4735	0.5091	0.0610	0.1998	0.6234	0.1868	0.6318	0.1696	0.2322
13	0.2262	0.8820	0.1555	0.4282	0.3205	0.4054	0.9718	0.3744	0.4835
14	0.7481	0.2950	0.0276	0.1002	0.9268	0.0930	0.3835	0.0835	0.1186
15	0.4540	0.5300	0.0649	0.2106	0.6007	0.1971	0.6550	0.1791	0.2444
16	0.6718	0.3427	0.0340	0.1205	0.8454	0.1121	0.4404	0.1009	0.1421

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16
1	0.2575	0.3032	0.4735	0.2262	0.7481	0.4540	0.6718
2	0.8170	0.7342	0.5091	0.8820	0.2950	0.5300	0.3427
3	0.1348	0.1113	0.0610	0.1555	0.0276	0.0649	0.0340
4	0.3828	0.3286	0.1998	0.4282	0.1002	0.2106	0.1205
5	0.3609	0.4185	0.6234	0.3205	0.9268	0.6007	0.8454
6	0.3616	0.3096	0.1868	0.4054	0.0930	0.1971	0.1121
7	0.9618	0.8758	0.6318	0.9718	0.3835	0.6550	0.4404
8	0.3330	0.2840	0.1696	0.3744	0.0835	0.1791	0.1009
9	0.4344	0.3753	0.2322	0.4835	0.1186	0.2444	0.1421
10	.	0.9136	0.6658	0.9337	0.4093	0.6896	0.4685
11	0.9136	.	0.7459	0.8480	0.4717	0.7707	0.5361
12	0.6658	0.7459	.	0.6071	0.6891	0.9738	0.7661
13	0.9337	0.8480	0.6071	.	0.3652	0.6300	0.4204
14	0.4093	0.4717	0.6891	0.3652	.	0.6653	0.9178
15	0.6896	0.7707	0.9738	0.6300	0.6653	.	0.7414
16	0.4685	0.5361	0.7661	0.4204	0.9178	0.7414	.

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
0	DEN	F	28.4003157	1
0	DEN	M	27.5840909	2
0	NONE	F	25.5713141	3
0	NONE	M	26.7521645	4
1	DEN	F	27.1001984	5
1	DEN	M	26.0262821	6
1	NONE	F	26.7902244	7
1	NONE	M	26.5502976	8
5	DEN	F	26.7256313	9
5	DEN	M	27.0952381	10
5	NONE	F	26.9358974	11
5	NONE	M	27.1814123	12
25	DEN	F	25.9833333	13
25	DEN	M	26.5922078	14
25	NONE	F	27.2682540	15
25	NONE	M	26.8535839	16

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2208	0.0004	0.0204	0.0594	0.0019	0.0231	0.0107	0.0188
2	0.2208	.	0.0063	0.2125	0.4610	0.0272	0.2332	0.1261	0.1990
3	0.0004	0.0063	.	0.0839	0.0297	0.4878	0.0752	0.1460	0.0904
4	0.0204	0.2125	0.0839	.	0.5944	0.2739	0.9534	0.7568	0.9675
5	0.0594	0.4610	0.0297	0.5944	.	0.1131	0.6351	0.4034	0.5669
6	0.0019	0.0272	0.4878	0.2739	0.1131	.	0.2505	0.4254	0.2912
7	0.0231	0.2332	0.0752	0.9534	0.6351	0.2505	.	0.7129	0.9209
8	0.0107	0.1261	0.1460	0.7568	0.4034	0.4254	0.7129	.	0.7878
9	0.0188	0.1990	0.0904	0.9675	0.5669	0.2912	0.9209	0.7878	.
10	0.0585	0.4565	0.0302	0.5997	0.9939	0.1147	0.6404	0.4075	0.5720
11	0.0362	0.3267	0.0490	0.7780	0.8009	0.1748	0.8230	0.5557	0.7470
12	0.0752	0.5385	0.0231	0.5124	0.9007	0.0902	0.5500	0.3392	0.4871
13	0.0017	0.0237	0.5292	0.2476	0.1005	0.9474	0.2259	0.3893	0.2636
14	0.0123	0.1411	0.1306	0.8060	0.4394	0.3901	0.7612	0.9487	0.8377
15	0.0963	0.6287	0.0175	0.4323	0.7964	0.0704	0.4664	0.2790	0.4095
16	0.0281	0.2710	0.0626	0.8762	0.7053	0.2149	0.9224	0.6423	0.8442

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	10	11	12	13	14	15	16
1	0.0585	0.0362	0.0752	0.0017	0.0123	0.0963	0.0281
2	0.4565	0.3267	0.5385	0.0237	0.1411	0.6287	0.2710
3	0.0302	0.0490	0.0231	0.5292	0.1306	0.0175	0.0626
4	0.5997	0.7780	0.5124	0.2476	0.8060	0.4323	0.8762
5	0.9939	0.8009	0.9007	0.1005	0.4394	0.7964	0.7053
6	0.1147	0.1748	0.0902	0.9474	0.3901	0.0704	0.2149
7	0.6404	0.8230	0.5500	0.2259	0.7612	0.4664	0.9224
8	0.4075	0.5557	0.3392	0.3893	0.9487	0.2790	0.6423
9	0.5720	0.7470	0.4871	0.2636	0.8377	0.4095	0.8442
10	.	0.8067	0.8947	0.1018	0.4438	0.7906	0.7110
11	0.8067	.	0.7066	0.1565	0.5990	0.6110	0.8994
12	0.8947	0.7066	.	0.0799	0.3714	0.8939	0.6158
13	0.1018	0.1565	0.0799	.	0.3560	0.0621	0.1932
14	0.4438	0.5990	0.3714	0.3560	.	0.3070	0.6887
15	0.7906	0.6110	0.8939	0.0621	0.3070	.	0.5266
16	0.7110	0.8994	0.6158	0.1932	0.6887	0.5266	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Least Squares Means

SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
F	388.644742	0.6342
M	385.128208	

SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
F	26.8468961	0.9238
M	26.8294097	

DILUENT	SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
apg	F	381.403795	1	.	0.1507	0.1770	0.4452
apg	M	396.879597	2	0.1507	.	0.9240	0.0358
creek	F	395.885689	3	0.1770	0.9240	.	0.0432
creek	M	373.376820	4	0.4452	0.0358	0.0432	.

DILUENT	SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
apg	F	27.5076179	1	.	0.4112	0.0001	0.0001
apg	M	27.7224083	2	0.4112	.	0.0001	0.0001
creek	F	26.1861742	3	0.0001	0.0001	.	0.3411
creek	M	25.9364110	4	0.0001	0.0001	0.3411	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

CONC	SEX	WGT LSMEAN	LSMEAN Number
0	F	383.420136	1
0	M	374.562635	2
1	F	399.077202	3
1	M	364.820009	4
5	F	379.904099	5
5	M	393.604095	6
25	F	392.177530	7
25	M	407.526095	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.5499	0.2963	0.2179	0.8115	0.4926	0.5544	0.1159
2	0.5499	.	0.1103	0.5113	0.7174	0.2077	0.2421	0.0371
3	0.2963	0.1103	.	0.0312	0.2047	0.7108	0.6406	0.5683
4	0.2179	0.5113	0.0312	.	0.3137	0.0646	0.0775	0.0095
5	0.8115	0.7174	0.2047	0.3137	.	0.3588	0.4098	0.0749
6	0.4926	0.2077	0.7108	0.0646	0.3588	.	0.9229	0.3513
7	0.5544	0.2421	0.6406	0.0775	0.4098	0.9229	.	0.3056
8	0.1159	0.0371	0.5683	0.0095	0.0749	0.3513	0.3056	.

CONC	SEX	LEN LSMEAN	LSMEAN Number
0	F	26.9858149	1
0	M	27.1681277	2
1	F	26.9452114	3
1	M	26.2882898	4
5	F	26.8307644	5
5	M	27.1383252	6
25	F	26.6257937	7
25	M	26.7228959	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.6194	0.9116	0.0705	0.6724	0.6774	0.3321	0.4757
2	0.6194	.	0.5444	0.0265	0.3626	0.9350	0.1514	0.2340
3	0.9116	0.5444	.	0.0867	0.7546	0.5990	0.3880	0.5455
4	0.0705	0.0265	0.0867	.	0.1513	0.0312	0.3624	0.2448
5	0.6724	0.3626	0.7546	0.1513	.	0.4055	0.5770	0.7683
6	0.6774	0.9350	0.5990	0.0312	0.4055	.	0.1737	0.2654

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
7	0.3321	0.1514	0.3880	0.3624	0.5770	0.1737	.	0.7908
8	0.4757	0.2340	0.5455	0.2448	0.7683	0.2654	0.7908	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

CAN_AGT	SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
DEN	F	395.713499	1	.	0.3721	0.1869	0.2685
DEN	M	386.297462	2	0.3721	.	0.6514	0.8225
NONE	F	381.575984	3	0.1869	0.6514	.	0.8192
NONE	M	383.958955	4	0.2685	0.8225	0.8192	.

CAN_AGT	SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
DEN	F	27.0523697	1	.	0.3838	0.1259	0.4044
DEN	M	26.8244547	2	0.3838	.	0.4824	0.9694
NONE	F	26.6414225	3	0.1259	0.4824	.	0.4594
NONE	M	26.8343646	4	0.4044	0.9694	0.4594	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

----------------------------------- MONTH=6 -----------------------------------

General Linear Models Procedure
Least Squares Means

CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
0	DEN	F	416.707260	1
0	DEN	M	382.579545	2
0	NONE	F	350.133013	3
0	NONE	M	366.545725	4
1	DEN	F	411.054563	5
1	DEN	M	365.537340	6
1	NONE	F	387.099840	7
1	NONE	M	364.102679	8
5	DEN	F	368.861616	9
5	DEN	M	388.277183	10
5	NONE	F	390.946581	11
5	NONE	M	398.931006	12
25	DEN	F	386.230556	13
25	DEN	M	408.795779	14
25	NONE	F	398.124504	15
25	NONE	M	406.256410	16

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.1155	0.0051	0.0264	0.7864	0.0239	0.1681	0.0208	0.0330
2	0.1155	.	0.1332	0.4457	0.1840	0.4182	0.8283	0.3810	0.5131
3	0.0051	0.1332	.	0.4352	0.0090	0.4635	0.0903	0.5055	0.3747
4	0.0264	0.4457	0.4352	.	0.0454	0.9614	0.3311	0.9067	0.9115
5	0.7864	0.1840	0.0090	0.0454	.	0.0412	0.2599	0.0360	0.0563
6	0.0239	0.4182	0.4635	0.9614	0.0412	.	0.3087	0.9451	0.8733
7	0.1681	0.8283	0.0903	0.3311	0.2599	0.3087	.	0.2787	0.3870
8	0.0208	0.3810	0.5055	0.9067	0.0360	0.9451	0.2787	.	0.8194
9	0.0330	0.5131	0.3747	0.9115	0.0563	0.8733	0.3870	0.8194	.
10	0.1847	0.7847	0.0814	0.3050	0.2831	0.2839	0.9549	0.2557	0.3578
11	0.2271	0.6887	0.0639	0.2515	0.3414	0.2332	0.8536	0.2090	0.2975
12	0.3989	0.4369	0.0301	0.1339	0.5627	0.1230	0.5720	0.1088	0.1620
13	0.1567	0.8609	0.0975	0.3514	0.2437	0.3280	0.9667	0.2966	0.4095
14	0.7047	0.2193	0.0113	0.0560	0.9137	0.0510	0.3058	0.0446	0.0693
15	0.3783	0.4595	0.0326	0.1431	0.5373	0.1316	0.5983	0.1166	0.1728
16	0.6173	0.2652	0.0146	0.0707	0.8180	0.0645	0.3641	0.0565	0.0870

MONTH=6

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16
1	0.1847	0.2271	0.3989	0.1567	0.7047	0.3783	0.6173
2	0.7847	0.6887	0.4369	0.8609	0.2193	0.4595	0.2652
3	0.0814	0.0639	0.0301	0.0975	0.0113	0.0326	0.0146
4	0.3050	0.2515	0.1339	0.3514	0.0560	0.1431	0.0707
5	0.2831	0.3414	0.5627	0.2437	0.9137	0.5373	0.8180
6	0.2839	0.2332	0.1230	0.3280	0.0510	0.1316	0.0645
7	0.9549	0.8536	0.5720	0.9667	0.3058	0.5983	0.3641
8	0.2557	0.2090	0.1088	0.2966	0.0446	0.1166	0.0565
9	0.3578	0.2975	0.1620	0.4095	0.0693	0.1728	0.0870
10	.	0.8981	0.6105	0.9217	0.3319	0.6376	0.3936
11	0.8981	.	0.7022	0.8210	0.3970	0.7309	0.4662
12	0.6105	0.7022	.	0.5444	0.6370	0.9691	0.7256
13	0.9217	0.8210	0.5444	.	0.2875	0.5700	0.3433
14	0.3319	0.3970	0.6370	0.2875	.	0.6099	0.9030
15	0.6376	0.7309	0.9691	0.5700	0.6099	.	0.6969
16	0.3936	0.4662	0.7256	0.3433	0.9030	0.6969	.

CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
0	DEN	F	28.4003157	1
0	DEN	M	27.5840909	2
0	NONE	F	25.5713141	3
0	NONE	M	26.7521645	4
1	DEN	F	27.1001984	5
1	DEN	M	26.0262821	6
1	NONE	F	26.7902244	7
1	NONE	M	26.5502976	8
5	DEN	F	26.7256313	9
5	DEN	M	27.0952381	10
5	NONE	F	26.9358974	11
5	NONE	M	27.1814123	12
25	DEN	F	25.9833333	13
25	DEN	M	26.5922078	14
25	NONE	F	27.2682540	15
25	NONE	M	26.8535839	16

--------------------------------- MONTH=6 ---------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8	9
1	.	0.1284	0.0001	0.0052	0.0212	0.0003	0.0060	0.0022	0.0046
2	0.1284	.	0.0011	0.1217	0.3560	0.0075	0.1384	0.0592	0.1111
3	0.0001	0.0011	.	0.0339	0.0084	0.3847	0.0292	0.0724	0.0376
4	0.0052	0.1217	0.0339	.	0.5039	0.1731	0.9413	0.6969	0.9591
5	0.0212	0.3560	0.0084	0.5039	.	0.0510	0.5511	0.2960	0.4725
6	0.0003	0.0075	0.3847	0.1731	0.0510	.	0.1529	0.3186	0.1884
7	0.0060	0.1384	0.0292	0.9413	0.5511	0.1529	.	0.6438	0.9006
8	0.0022	0.0592	0.0724	0.6969	0.2960	0.3186	0.6438	.	0.7350
9	0.0046	0.1111	0.0376	0.9591	0.4725	0.1884	0.9006	0.7350	.
10	0.0208	0.3512	0.0086	0.5100	0.9923	0.0519	0.5574	0.3003	0.4783
11	0.0110	0.2211	0.0164	0.7229	0.7511	0.0929	0.7784	0.4598	0.6850
12	0.0292	0.4405	0.0060	0.4115	0.8752	0.0374	0.4534	0.2329	0.3839
13	0.0002	0.0063	0.4302	0.1505	0.0433	0.9338	0.1325	0.2818	0.1641
14	0.0027	0.0691	0.0621	0.7574	0.3332	0.2827	0.7024	0.9354	0.7966
15	0.0409	0.5437	0.0042	0.3257	0.7456	0.0267	0.3617	0.1776	0.3023
16	0.0078	0.1705	0.0228	0.8446	0.6346	0.1237	0.9025	0.5596	0.8047

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16
1	0.0208	0.0110	0.0292	0.0002	0.0027	0.0409	0.0078
2	0.3512	0.2211	0.4405	0.0063	0.0691	0.5437	0.1705
3	0.0086	0.0164	0.0060	0.4302	0.0621	0.0042	0.0228
4	0.5100	0.7229	0.4115	0.1505	0.7574	0.3257	0.8446
5	0.9923	0.7511	0.8752	0.0433	0.3332	0.7456	0.6346
6	0.0519	0.0929	0.0374	0.9338	0.2827	0.0267	0.1237
7	0.5574	0.7784	0.4534	0.1325	0.7024	0.3617	0.9025
8	0.3003	0.4598	0.2329	0.2818	0.9354	0.1776	0.5596
9	0.4783	0.6850	0.3839	0.1641	0.7966	0.3023	0.8047
10	.	0.7583	0.8677	0.0442	0.3378	0.7384	0.6414
11	0.7583	.	0.6361	0.0797	0.5092	0.5231	0.8736
12	0.8677	0.6361	.	0.0317	0.2641	0.8667	0.5287
13	0.0442	0.0797	0.0317	.	0.2491	0.0225	0.1067
14	0.3378	0.5092	0.2641	0.2491	.	0.2028	0.6146
15	0.7384	0.5231	0.8667	0.0225	0.2028	.	0.4273
16	0.6414	0.8736	0.5287	0.1067	0.6146	0.4273	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

DILUENT	CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
apg	0	DEN	F	432.423611	1
apg	0	DEN	M	414.259091	2
apg	0	NONE	F	329.057692	3
apg	0	NONE	M	382.428571	4
apg	1	DEN	F	409.553571	5
apg	1	DEN	M	377.112179	6
apg	1	NONE	F	375.483333	7
apg	1	NONE	M	374.812500	8
apg	5	DEN	F	378.927778	9
apg	5	DEN	M	422.488889	10
apg	5	NONE	F	372.970085	11
apg	5	NONE	M	406.772727	12
apg	25	DEN	F	372.350000	13
apg	25	DEN	M	396.900000	14
apg	25	NONE	F	380.464286	15
apg	25	NONE	M	400.262821	16
creek	0	DEN	F	400.990909	17
creek	0	DEN	M	350.900000	18
creek	0	NONE	F	371.208333	19
creek	0	NONE	M	350.662879	20
creek	1	DEN	F	412.555556	21
creek	1	DEN	M	353.962500	22
creek	1	NONE	F	398.716346	23
creek	1	NONE	M	353.392857	24
creek	5	DEN	F	358.795455	25
creek	5	DEN	M	354.065476	26
creek	5	NONE	F	408.923077	27
creek	5	NONE	M	391.089286	28
creek	25	DEN	F	400.111111	29
creek	25	DEN	M	420.691558	30
creek	25	NONE	F	415.784722	31
creek	25	NONE	M	412.250000	32

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.5399	0.0026	0.1040	0.4419	0.0746	0.0672	0.0644	0.0837
2	0.5399	.	0.0097	0.2887	0.8731	0.2185	0.1999	0.1926	0.2408
3	0.0026	0.0097	.	0.0844	0.0135	0.1170	0.1290	0.1342	0.1048
4	0.1040	0.2887	0.0844	.	0.3635	0.8569	0.8138	0.7962	0.9054
5	0.4419	0.8731	0.0135	0.3635	.	0.2798	0.2573	0.2484	0.3067
6	0.0746	0.2185	0.1170	0.8569	0.2798	.	0.9559	0.9378	0.9509
7	0.0672	0.1999	0.1290	0.8138	0.2573	0.9559	.	0.9818	0.9069

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8	9
8	0.0644	0.1926	0.1342	0.7962	0.2484	0.9378	0.9818	.	0.8889
9	0.0837	0.2408	0.1048	0.9054	0.3067	0.9509	0.9069	0.8889	.
10	0.7364	0.7802	0.0053	0.1862	0.6616	0.1372	0.1246	0.1197	0.1526
11	0.0571	0.1738	0.1495	0.7485	0.2252	0.8882	0.9320	0.9501	0.8398
12	0.3895	0.7996	0.0164	0.4136	0.9248	0.3217	0.2966	0.2868	0.3513
13	0.0549	0.1677	0.1550	0.7327	0.2178	0.8716	0.9153	0.9334	0.8234
14	0.2383	0.5579	0.0326	0.6246	0.6684	0.5048	0.4709	0.4574	0.5442
15	0.0921	0.2610	0.0953	0.9468	0.3308	0.9094	0.8658	0.8479	0.9584
16	0.2839	0.6359	0.0259	0.5472	0.7528	0.4364	0.4055	0.3932	0.4726
17	0.2945	0.6535	0.0246	0.5312	0.7716	0.4224	0.3921	0.3801	0.4579
18	0.0126	0.0441	0.4623	0.2931	0.0602	0.3795	0.4091	0.4218	0.3482
19	0.0509	0.1571	0.1655	0.7039	0.2047	0.8413	0.8847	0.9026	0.7935
20	0.0123	0.0434	0.4671	0.2896	0.0593	0.3753	0.4047	0.4173	0.3443
21	0.5031	0.9539	0.0109	0.3143	0.9188	0.2394	0.2194	0.2115	0.2633
22	0.0156	0.0541	0.4032	0.3409	0.0733	0.4364	0.4688	0.4826	0.4021
23	0.2622	0.5994	0.0288	0.5822	0.7136	0.4671	0.4348	0.4219	0.5048
24	0.0150	0.0521	0.4138	0.3316	0.0707	0.4255	0.4573	0.4709	0.3916
25	0.0219	0.0739	0.3204	0.4271	0.0992	0.5366	0.5730	0.5884	0.4975
26	0.0157	0.0544	0.4013	0.3426	0.0738	0.4384	0.4709	0.4847	0.4040
27	0.4296	0.8563	0.0141	0.3745	0.9829	0.2889	0.2658	0.2567	0.3164
28	0.1733	0.4360	0.0482	0.7691	0.5334	0.6364	0.5979	0.5824	0.6805
29	0.2817	0.6323	0.0262	0.5506	0.7490	0.4394	0.4083	0.3959	0.4757
30	0.6912	0.8273	0.0061	0.2056	0.7060	0.1524	0.1386	0.1332	0.1691
31	0.5741	0.9587	0.0087	0.2670	0.8326	0.2011	0.1837	0.1769	0.2219
32	0.4967	0.9456	0.0111	0.3191	0.9271	0.2433	0.2230	0.2151	0.2675

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.7364	0.0571	0.3895	0.0549	0.2383	0.0921	0.2839	0.2945	0.0126
2	0.7802	0.1738	0.7996	0.1677	0.5579	0.2610	0.6359	0.6535	0.0441
3	0.0053	0.1495	0.0164	0.1550	0.0326	0.0953	0.0259	0.0246	0.4623
4	0.1862	0.7485	0.4136	0.7327	0.6246	0.9468	0.5472	0.5312	0.2931
5	0.6616	0.2252	0.9248	0.2178	0.6684	0.3308	0.7528	0.7716	0.0602
6	0.1372	0.8882	0.3217	0.8716	0.5048	0.9094	0.4364	0.4224	0.3795
7	0.1246	0.9320	0.2966	0.9153	0.4709	0.8658	0.4055	0.3921	0.4091
8	0.1197	0.9501	0.2868	0.9334	0.4574	0.8479	0.3932	0.3801	0.4218
9	0.1526	0.8398	0.3513	0.8234	0.5442	0.9584	0.4726	0.4579	0.3482
10	.	0.1071	0.5954	0.1031	0.3907	0.1666	0.4546	0.4693	0.0252
11	0.1071	.	0.2609	0.9832	0.4214	0.7994	0.3607	0.3483	0.4577

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16	17	18
12	0.5954	0.2609	.	0.2526	0.7380	0.3778	0.8252	0.8445	0.0720
13	0.1031	0.9832	0.2526	.	0.4098	0.7832	0.3501	0.3381	0.4703
14	0.3907	0.4214	0.7380	0.4098	.	0.5788	0.9091	0.8896	0.1323
15	0.1666	0.7994	0.3778	0.7832	0.5788	.	0.5046	0.4893	0.3232
16	0.4546	0.3607	0.8252	0.3501	0.9091	0.5046	.	0.9803	0.1081
17	0.4693	0.3483	0.8445	0.3381	0.8896	0.4893	0.9803	.	0.1034
18	0.0252	0.4577	0.0720	0.4703	0.1323	0.3232	0.1081	0.1034	.
19	0.0961	0.9523	0.2378	0.9691	0.3888	0.7537	0.3313	0.3197	0.4938
20	0.0248	0.4530	0.0709	0.4654	0.1304	0.3194	0.1065	0.1019	0.9936
21	0.7364	0.1912	0.8445	0.1847	0.5968	0.2849	0.6773	0.6953	0.0494
22	0.0311	0.5215	0.0874	0.5350	0.1582	0.3744	0.1299	0.1244	0.9172
23	0.4244	0.3878	0.7847	0.3768	0.9508	0.5380	0.9581	0.9385	0.1187
24	0.0299	0.5093	0.0843	0.5226	0.1530	0.3645	0.1256	0.1203	0.9326
25	0.0432	0.6317	0.1176	0.6465	0.2074	0.4658	0.1720	0.1650	0.7889
26	0.0314	0.5238	0.0879	0.5373	0.1591	0.3762	0.1307	0.1252	0.9144
27	0.6463	0.2330	0.9418	0.2254	0.6840	0.3411	0.7691	0.7880	0.0627
28	0.2950	0.5409	0.5961	0.5273	0.8437	0.7189	0.7559	0.7372	0.1848
29	0.4516	0.3633	0.8212	0.3527	0.9132	0.5078	0.9959	0.9762	0.1091
30	0.9514	0.1194	0.6378	0.1150	0.4241	0.1844	0.4913	0.5067	0.0286
31	0.8201	0.1593	0.7600	0.1537	0.5242	0.2409	0.5999	0.6169	0.0399
32	0.7287	0.1944	0.8526	0.1878	0.6039	0.2893	0.6849	0.7030	0.0504

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	19	20	21	22	23	24	25	26	27
1	0.0509	0.0123	0.5031	0.0156	0.2622	0.0150	0.0219	0.0157	0.4296
2	0.1571	0.0434	0.9539	0.0541	0.5994	0.0521	0.0739	0.0544	0.8563
3	0.1655	0.4671	0.0109	0.4032	0.0288	0.4138	0.3204	0.4013	0.0141
4	0.7039	0.2896	0.3143	0.3409	0.5822	0.3316	0.4271	0.3426	0.3745
5	0.2047	0.0593	0.9188	0.0733	0.7136	0.0707	0.0992	0.0738	0.9829
6	0.8413	0.3753	0.2394	0.4364	0.4671	0.4255	0.5366	0.4384	0.2889
7	0.8847	0.4047	0.2194	0.4688	0.4348	0.4573	0.5730	0.4709	0.2658
8	0.9026	0.4173	0.2115	0.4826	0.4219	0.4709	0.5884	0.4847	0.2567
9	0.7935	0.3443	0.2633	0.4021	0.5048	0.3916	0.4975	0.4040	0.3164
10	0.0961	0.0248	0.7364	0.0311	0.4244	0.0299	0.0432	0.0314	0.6463
11	0.9523	0.4530	0.1912	0.5215	0.3878	0.5093	0.6317	0.5238	0.2330
12	0.2378	0.0709	0.8445	0.0874	0.7847	0.0843	0.1176	0.0879	0.9418
13	0.9691	0.4654	0.1847	0.5350	0.3768	0.5226	0.6465	0.5373	0.2254
14	0.3888	0.1304	0.5968	0.1582	0.9508	0.1530	0.2074	0.1591	0.6840
15	0.7537	0.3194	0.2849	0.3744	0.5380	0.3645	0.4658	0.3762	0.3411

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	19	20	21	22	23	24	25	26	27
16	0.3313	0.1065	0.6773	0.1299	0.9581	0.1256	0.1720	0.1307	0.7691
17	0.3197	0.1019	0.6953	0.1244	0.9385	0.1203	0.1650	0.1252	0.7880
18	0.4938	0.9936	0.0494	0.9172	0.1187	0.9326	0.7889	0.9144	0.0627
19	.	0.4889	0.1732	0.5604	0.3570	0.5477	0.6744	0.5627	0.2119
20	0.4889	.	0.0487	0.9108	0.1170	0.9262	0.7828	0.9081	0.0617
21	0.1732	0.0487	.	0.0604	0.6397	0.0582	0.0823	0.0608	0.9019
22	0.5604	0.9108	0.0604	.	0.1423	0.9846	0.8697	0.9972	0.0763
23	0.3570	0.1170	0.6397	0.1423	.	0.1377	0.1876	0.1432	0.7295
24	0.5477	0.9262	0.0582	0.9846	0.1377	.	0.8546	0.9818	0.0736
25	0.6744	0.7828	0.0823	0.8697	0.1876	0.8546	.	0.8725	0.1032
26	0.5627	0.9081	0.0608	0.9972	0.1432	0.9818	0.8725	.	0.0768
27	0.2119	0.0617	0.9019	0.0763	0.7295	0.0736	0.1032	0.0768	.
28	0.5028	0.1824	0.4699	0.2187	0.7959	0.2121	0.2819	0.2200	0.5473
29	0.3338	0.1075	0.6736	0.1311	0.9622	0.1268	0.1735	0.1319	0.7652
30	0.1073	0.0281	0.7827	0.0352	0.4596	0.0339	0.0486	0.0354	0.6903
31	0.1438	0.0392	0.9127	0.0489	0.5644	0.0471	0.0670	0.0492	0.8160
32	0.1762	0.0497	0.9917	0.0616	0.6470	0.0594	0.0839	0.0620	0.9101

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	28	29	30	31	32
1	0.1733	0.2817	0.6912	0.5741	0.4967
2	0.4360	0.6323	0.8273	0.9587	0.9456
3	0.0482	0.0262	0.0061	0.0087	0.0111
4	0.7691	0.5506	0.2056	0.2670	0.3191
5	0.5334	0.7490	0.7060	0.8326	0.9271
6	0.6364	0.4394	0.1524	0.2011	0.2433
7	0.5979	0.4083	0.1386	0.1837	0.2230
8	0.5824	0.3959	0.1332	0.1769	0.2151
9	0.6805	0.4757	0.1691	0.2219	0.2675
10	0.2950	0.4516	0.9514	0.8201	0.7287
11	0.5409	0.3633	0.1194	0.1593	0.1944
12	0.5961	0.8212	0.6378	0.7600	0.8526
13	0.5273	0.3527	0.1150	0.1537	0.1878
14	0.8437	0.9132	0.4241	0.5242	0.6039
15	0.7189	0.5078	0.1844	0.2409	0.2893
16	0.7559	0.9959	0.4913	0.5999	0.6849
17	0.7372	0.9762	0.5067	0.6169	0.7030
18	0.1848	0.1091	0.0286	0.0399	0.0504
19	0.5028	0.3338	0.1073	0.1438	0.1762

------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	28	29	30	31	32
20	0.1824	0.1075	0.0281	0.0392	0.0497
21	0.4699	0.6736	0.7827	0.9127	0.9917
22	0.2187	0.1311	0.0352	0.0489	0.0616
23	0.7959	0.9622	0.4596	0.5644	0.6470
24	0.2121	0.1268	0.0339	0.0471	0.0594
25	0.2819	0.1735	0.0486	0.0670	0.0839
26	0.2200	0.1319	0.0354	0.0492	0.0620
27	0.5473	0.7652	0.6903	0.8160	0.9101
28	.	0.7598	0.3226	0.4070	0.4762
29	0.7598	.	0.4881	0.5963	0.6811
30	0.3226	0.4881	.	0.8678	0.7747
31	0.4070	0.5963	0.8678	.	0.9045
32	0.4762	0.6811	0.7747	0.9045	.

DILUENT	CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
apg	0	DEN	F	29.4097222	1
apg	0	DEN	M	28.5681818	2
apg	0	NONE	F	25.0384615	3
apg	0	NONE	M	27.4702381	4
apg	1	DEN	F	27.8392857	5
apg	1	DEN	M	26.6025641	6
apg	1	NONE	F	27.2583333	7
apg	1	NONE	M	27.2375000	8
apg	5	DEN	F	27.8944444	9
apg	5	DEN	M	28.7500000	10
apg	5	NONE	F	27.7564103	11
apg	5	NONE	M	27.9610390	12
apg	25	DEN	F	26.8000000	13
apg	25	DEN	M	27.3500000	14
apg	25	NONE	F	28.0642857	15
apg	25	NONE	M	27.8397436	16
creek	0	DEN	F	27.3909091	17
creek	0	DEN	M	26.6000000	18
creek	0	NONE	F	26.1041667	19
creek	0	NONE	M	26.0340909	20
creek	1	DEN	F	26.3611111	21
creek	1	DEN	M	25.4500000	22

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

DILUENT	CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
creek	1	NONE	F	26.3221154	23
creek	1	NONE	M	25.8630952	24
creek	5	DEN	F	25.5568182	25
creek	5	DEN	M	25.4404762	26
creek	5	NONE	F	26.1153846	27
creek	5	NONE	M	26.4017857	28
creek	25	DEN	F	25.1666667	29
creek	25	DEN	M	25.8344156	30
creek	25	NONE	F	26.4722222	31
creek	25	NONE	M	25.8674242	32

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2595	0.0001	0.0160	0.0444	0.0013	0.0087	0.0082	0.0515
2	0.2595	.	0.0002	0.1467	0.3264	0.0148	0.0876	0.0831	0.3633
3	0.0001	0.0002	.	0.0038	0.0013	0.0452	0.0071	0.0076	0.0011
4	0.0160	0.1467	0.0038	.	0.6152	0.2456	0.7723	0.7507	0.5639
5	0.0444	0.3264	0.0013	0.6152	.	0.1051	0.4315	0.4155	0.9399
6	0.0013	0.0148	0.0452	0.2456	0.1051	.	0.3759	0.3908	0.0916
7	0.0087	0.0876	0.0071	0.7723	0.4315	0.3759	.	0.9773	0.3900
8	0.0082	0.0831	0.0076	0.7507	0.4155	0.3908	0.9773	.	0.3750
9	0.0515	0.3633	0.0011	0.5639	0.9399	0.0916	0.3900	0.3750	.
10	0.3731	0.8038	0.0001	0.0945	0.2240	0.0088	0.0548	0.0518	0.2520
11	0.0355	0.2761	0.0017	0.6962	0.9098	0.1285	0.4989	0.4814	0.8504
12	0.0613	0.4115	0.0009	0.5051	0.8678	0.0774	0.3435	0.3298	0.9274
13	0.0023	0.0259	0.0263	0.3657	0.1681	0.7874	0.5333	0.5519	0.1480
14	0.0113	0.1100	0.0055	0.8694	0.5064	0.3146	0.9003	0.8778	0.4605
15	0.0801	0.4940	0.0007	0.4214	0.7587	0.0593	0.2794	0.2677	0.8165
16	0.0445	0.3267	0.0013	0.6148	0.9995	0.1050	0.4312	0.4152	0.9404
17	0.0127	0.1215	0.0048	0.9136	0.5422	0.2897	0.8562	0.8339	0.4943
18	0.0013	0.0147	0.0455	0.2443	0.1044	0.9972	0.3740	0.3890	0.0911
19	0.0003	0.0035	0.1582	0.0759	0.0283	0.4987	0.1284	0.1350	0.0243
20	0.0002	0.0028	0.1857	0.0634	0.0233	0.4413	0.1084	0.1140	0.0200
21	0.0006	0.0074	0.0848	0.1429	0.0568	0.7417	0.2306	0.2411	0.0490
22	0.0001	0.0005	0.5755	0.0127	0.0043	0.1289	0.0231	0.0245	0.0037
23	0.0006	0.0066	0.0936	0.1303	0.0512	0.7020	0.2119	0.2217	0.0442
24	0.0002	0.0017	0.2689	0.0402	0.0144	0.3196	0.0705	0.0743	0.0123
25	0.0001	0.0007	0.4819	0.0172	0.0059	0.1657	0.0311	0.0329	0.0051
26	0.0001	0.0005	0.5843	0.0123	0.0042	0.1260	0.0225	0.0239	0.0036
27	0.0003	0.0036	0.1541	0.0782	0.0292	0.5082	0.1319	0.1386	0.0251
28	0.0007	0.0083	0.0765	0.1572	0.0632	0.7839	0.2515	0.2627	0.0546
29	0.0001	0.0002	0.8609	0.0056	0.0019	0.0634	0.0103	0.0110	0.0016

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8	9
30	0.0001	0.0016	0.2852	0.0372	0.0132	0.3018	0.0654	0.0691	0.0113
31	0.0009	0.0102	0.0638	0.1847	0.0758	0.8586	0.2910	0.3036	0.0657
32	0.0002	0.0017	0.2664	0.0407	0.0146	0.3224	0.0713	0.0752	0.0124

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.3731	0.0355	0.0613	0.0023	0.0113	0.0801	0.0445	0.0127	0.0013
2	0.8038	0.2761	0.4115	0.0259	0.1100	0.4940	0.3267	0.1215	0.0147
3	0.0001	0.0017	0.0009	0.0263	0.0055	0.0007	0.0013	0.0048	0.0455
4	0.0945	0.6962	0.5051	0.3657	0.8694	0.4214	0.6148	0.9136	0.2443
5	0.2240	0.9098	0.8678	0.1681	0.5064	0.7587	0.9995	0.5422	0.1044
6	0.0088	0.1285	0.0774	0.7874	0.3146	0.0593	0.1050	0.2897	0.9972
7	0.0548	0.4989	0.3435	0.5333	0.9003	0.2794	0.4312	0.8562	0.3740
8	0.0518	0.4814	0.3298	0.5519	0.8778	0.2677	0.4152	0.8339	0.3890
9	0.2520	0.8504	0.9274	0.1480	0.4605	0.8165	0.9404	0.4943	0.0911
10	.	0.1865	0.2893	0.0155	0.0696	0.3550	0.2242	0.0773	0.0087
11	0.1865	.	0.7799	0.2026	0.5802	0.6746	0.9093	0.6186	0.1278
12	0.2893	0.7799	.	0.1263	0.4085	0.8878	0.8683	0.4400	0.0769
13	0.0155	0.2026	0.1263	.	0.4560	0.0982	0.1680	0.4238	0.7847
14	0.0696	0.5802	0.4085	0.4560	.	0.3359	0.5060	0.9554	0.3130
15	0.3550	0.6746	0.8878	0.0982	0.3359	.	0.7591	0.3635	0.0589
16	0.2242	0.9093	0.8683	0.1680	0.5060	0.7591	.	0.5418	0.1043
17	0.0773	0.6186	0.4400	0.4238	0.9554	0.3635	0.5418	.	0.2882
18	0.0087	0.1278	0.0769	0.7847	0.3130	0.0589	0.1043	0.2882	.
19	0.0020	0.0356	0.0202	0.3481	0.1028	0.0151	0.0283	0.0928	0.5008
20	0.0017	0.0294	0.0165	0.3032	0.0863	0.0123	0.0233	0.0778	0.4433
21	0.0043	0.0705	0.0410	0.5507	0.1885	0.0309	0.0567	0.1718	0.7443
22	0.0003	0.0055	0.0030	0.0791	0.0179	0.0022	0.0043	0.0159	0.1297
23	0.0039	0.0637	0.0369	0.5163	0.1726	0.0278	0.0511	0.1571	0.7046
24	0.0010	0.0182	0.0101	0.2115	0.0555	0.0075	0.0144	0.0498	0.3212
25	0.0004	0.0076	0.0042	0.1034	0.0241	0.0031	0.0059	0.0215	0.1666
26	0.0003	0.0054	0.0030	0.0772	0.0174	0.0022	0.0042	0.0155	0.1268
27	0.0021	0.0367	0.0208	0.3558	0.1056	0.0155	0.0292	0.0955	0.5104
28	0.0049	0.0782	0.0458	0.5878	0.2063	0.0346	0.0631	0.1884	0.7866
29	0.0001	0.0024	0.0013	0.0375	0.0079	0.0010	0.0019	0.0070	0.0638
30	0.0009	0.0168	0.0093	0.1986	0.0514	0.0069	0.0132	0.0461	0.3034
31	0.0060	0.0934	0.0552	0.6550	0.2404	0.0419	0.0757	0.2201	0.8613
32	0.0010	0.0184	0.0103	0.2136	0.0561	0.0076	0.0145	0.0504	0.3240

------------------------------- MONTH=6 -------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	19	20	21	22	23	24	25	26	27
1	0.0003	0.0002	0.0006	0.0001	0.0006	0.0002	0.0001	0.0001	0.0003
2	0.0035	0.0028	0.0074	0.0005	0.0066	0.0017	0.0007	0.0005	0.0036
3	0.1582	0.1857	0.0848	0.5755	0.0936	0.2689	0.4819	0.5843	0.1541
4	0.0759	0.0634	0.1429	0.0127	0.1303	0.0402	0.0172	0.0123	0.0782
5	0.0283	0.0233	0.0568	0.0043	0.0512	0.0144	0.0059	0.0042	0.0292
6	0.4987	0.4413	0.7417	0.1289	0.7020	0.3196	0.1657	0.1260	0.5082
7	0.1284	0.1084	0.2306	0.0231	0.2119	0.0705	0.0311	0.0225	0.1319
8	0.1350	0.1140	0.2411	0.0245	0.2217	0.0743	0.0329	0.0239	0.1386
9	0.0243	0.0200	0.0490	0.0037	0.0442	0.0123	0.0051	0.0036	0.0251
10	0.0020	0.0017	0.0043	0.0003	0.0039	0.0010	0.0004	0.0003	0.0021
11	0.0356	0.0294	0.0705	0.0055	0.0637	0.0182	0.0076	0.0054	0.0367
12	0.0202	0.0165	0.0410	0.0030	0.0369	0.0101	0.0042	0.0030	0.0208
13	0.3481	0.3032	0.5507	0.0791	0.5163	0.2115	0.1034	0.0772	0.3558
14	0.1028	0.0863	0.1885	0.0179	0.1726	0.0555	0.0241	0.0174	0.1056
15	0.0151	0.0123	0.0309	0.0022	0.0278	0.0075	0.0031	0.0022	0.0155
16	0.0283	0.0233	0.0567	0.0043	0.0511	0.0144	0.0059	0.0042	0.0292
17	0.0928	0.0778	0.1718	0.0159	0.1571	0.0498	0.0215	0.0155	0.0955
18	0.5008	0.4433	0.7443	0.1297	0.7046	0.3212	0.1666	0.1268	0.5104
19	.	0.9237	0.7258	0.3770	0.7660	0.7421	0.4581	0.3703	0.9878
20	0.9237	.	0.6557	0.4291	0.6944	0.8153	0.5168	0.4217	0.9115
21	0.7258	0.6557	.	0.2238	0.9575	0.4990	0.2804	0.2192	0.7373
22	0.3770	0.4291	0.2238	.	0.2433	0.5741	0.8839	0.9896	0.3691
23	0.7660	0.6944	0.9575	0.2433	.	0.5327	0.3035	0.2384	0.7777
24	0.7421	0.8153	0.4990	0.5741	0.5327	.	0.6762	0.5654	0.7306
25	0.4581	0.5168	0.2804	0.8839	0.3035	0.6762	.	0.8736	0.4491
26	0.3703	0.4217	0.2192	0.9896	0.2384	0.5654	0.8736	.	0.3624
27	0.9878	0.9115	0.7373	0.3691	0.7777	0.7306	0.4491	0.3624	.
28	0.6848	0.6165	0.9556	0.2047	0.9133	0.4651	0.2577	0.2005	0.6960
29	0.2113	0.2458	0.1166	0.6991	0.1280	0.3477	0.5953	0.7087	0.2061
30	0.7128	0.7851	0.4750	0.6007	0.5078	0.9687	0.7049	0.5918	0.7015
31	0.6162	0.5513	0.8793	0.1748	0.8375	0.4100	0.2217	0.1711	0.6269
32	0.7465	0.8199	0.5027	0.5701	0.5366	0.9953	0.6719	0.5614	0.7350

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	28	29	30	31	32
1	0.0007	0.0001	0.0001	0.0009	0.0002
2	0.0083	0.0002	0.0016	0.0102	0.0017
3	0.0765	0.8609	0.2852	0.0638	0.2664
4	0.1572	0.0056	0.0372	0.1847	0.0407
5	0.0632	0.0019	0.0132	0.0758	0.0146
6	0.7839	0.0634	0.3018	0.8586	0.3224
7	0.2515	0.0103	0.0654	0.2910	0.0713
8	0.2627	0.0110	0.0691	0.3036	0.0752
9	0.0546	0.0016	0.0113	0.0657	0.0124
10	0.0049	0.0001	0.0009	0.0060	0.0010
11	0.0782	0.0024	0.0168	0.0934	0.0184
12	0.0458	0.0013	0.0093	0.0552	0.0103
13	0.5878	0.0375	0.1986	0.6550	0.2136
14	0.2063	0.0079	0.0514	0.2404	0.0561
15	0.0346	0.0010	0.0069	0.0419	0.0076
16	0.0631	0.0019	0.0132	0.0757	0.0145
17	0.1884	0.0070	0.0461	0.2201	0.0504
18	0.7866	0.0638	0.3034	0.8613	0.3240
19	0.6848	0.2113	0.7128	0.6162	0.7465
20	0.6165	0.2458	0.7851	0.5513	0.8199
21	0.9556	0.1166	0.4750	0.8793	0.5027
22	0.2047	0.6991	0.6007	0.1748	0.5701
23	0.9133	0.1280	0.5078	0.8375	0.5366
24	0.4651	0.3477	0.9687	0.4100	0.9953
25	0.2577	0.5953	0.7049	0.2217	0.6719
26	0.2005	0.7087	0.5918	0.1711	0.5614
27	0.6960	0.2061	0.7015	0.6269	0.7350
28	.	0.1055	0.4421	0.9233	0.4687
29	0.1055	.	0.3674	0.0886	0.3448
30	0.4421	0.3674	.	0.3888	0.9640
31	0.9233	0.0886	0.3888	.	0.4132
32	0.4687	0.3448	0.9640	0.4132	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

----------------------------------- MONTH=9 -----------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	2	apg creek
CONC	4	0 1 5 25
TANK	32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
CAN_AGT	2	DEN NONE
SEX	2	F M

Number of observations in by group = 64

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	47	185948.30216	3956.34685	5.24	0.0004
Error	16	12089.51793	755.59487		
Corrected Total	63	198037.82009			

R-Square	C.V.	Root MSE	WGT Mean
0.938953	5.527995	27.488086	497.25240

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	26078.399404	26078.399404	34.51	0.0001
CONC	3	20728.427646	6909.475882	9.14	0.0009
CAN_AGT	1	648.973165	648.973165	0.86	0.3678
DILUENT*CONC	3	3570.783789	1190.261263	1.58	0.2343
DILUENT*CAN_AGT	1	1644.402617	1644.402617	2.18	0.1596
CONC*CAN_AGT	3	9109.446646	3036.482215	4.02	0.0262
DILUENT*CONC*CAN_AGT	3	12901.329578	4300.443193	5.69	0.0076
TANK(DILU*CONC*CAN_)	16	34125.922825	2132.870177	2.82	0.0227
SEX	1	45410.814517	45410.814517	60.10	0.0001
DILUENT*SEX	1	9765.106466	9765.106466	12.92	0.0024
CONC*SEX	3	3388.193900	1129.397967	1.49	0.2539
CAN_AGT*SEX	1	4462.313012	4462.313012	5.91	0.0272
DILUENT*CONC*SEX	3	1199.383396	399.794465	0.53	0.6687
DILUENT*CAN_AGT*SEX	1	1345.639931	1345.639931	1.78	0.2007
CONC*CAN_AGT*SEX	3	3904.849124	1301.616375	1.72	0.2026
DILUE*CONC*CAN_A*SEX	3	7664.316142	2554.772047	3.38	0.0443

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	26078.399404	26078.399404	34.51	0.0001
CONC	3	20728.427646	6909.475882	9.14	0.0009
CAN_AGT	1	648.973165	648.973165	0.86	0.3678
DILUENT*CONC	3	3570.783789	1190.261263	1.58	0.2343
DILUENT*CAN_AGT	1	1644.402617	1644.402617	2.18	0.1596
CONC*CAN_AGT	3	9109.446646	3036.482215	4.02	0.0262
DILUENT*CONC*CAN_AGT	3	12901.329578	4300.443193	5.69	0.0076
TANK(DILU*CONC*CAN_)	16	34125.922825	2132.870177	2.82	0.0227
SEX	1	45410.814517	45410.814517	60.10	0.0001
DILUENT*SEX	1	9765.106466	9765.106466	12.92	0.0024

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure

Dependent Variable: WGT

Source	DF	Type III SS	Mean Square	F Value	Pr > F
CONC*SEX	3	3388.193900	1129.397967	1.49	0.2539
CAN_AGT*SEX	1	4462.313012	4462.313012	5.91	0.0272
DILUENT*CONC*SEX	3	1199.383396	399.794465	0.53	0.6687
DILUENT*CAN_AGT*SEX	1	1345.639931	1345.639931	1.78	0.2007
CONC*CAN_AGT*SEX	3	3904.849124	1301.616375	1.72	0.2026
DILUE*CONC*CAN_A*SEX	3	7664.316142	2554.772047	3.38	0.0443

Tests of Hypotheses using the Type III MS for
TANK(DILU*CONC*CAN_) as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	26078.399404	26078.399404	12.23	0.0030
CONC	3	20728.427646	6909.475882	3.24	0.0500
CAN_AGT	1	648.973165	648.973165	0.30	0.5888
DILUENT*CONC	3	3570.783789	1190.261263	0.56	0.6503
DILUENT*CAN_AGT	1	1644.402617	1644.402617	0.77	0.3929
CONC*CAN_AGT	3	9109.446646	3036.482215	1.42	0.2726
DILUENT*CONC*CAN_AGT	3	12901.329578	4300.443193	2.02	0.1522

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	47	60.03759951	1.27739573	7.41	0.0001
Error	16	2.75897705	0.17243607		
Corrected Total	63	62.79657656			

R-Square	C.V.	Root MSE	LEN Mean
0.956065	1.468535	0.4152542	28.276771

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	10.23743666	10.23743666	59.37	0.0001
CONC	3	3.00604044	1.00201348	5.81	0.0070
CAN_AGT	1	0.00078954	0.00078954	0.00	0.9469
DILUENT*CONC	3	1.77620962	0.59206987	3.43	0.0424
DILUENT*CAN_AGT	1	1.21652419	1.21652419	7.05	0.0173
CONC*CAN_AGT	3	1.79566223	0.59855408	3.47	0.0410
DILUENT*CONC*CAN_AGT	3	1.29258449	0.43086150	2.50	0.0967
TANK(DILU*CONC*CAN_)	16	13.11333477	0.81958342	4.75	0.0017
SEX	1	13.93935523	13.93935523	80.84	0.0001
DILUENT*SEX	1	4.70310639	4.70310639	27.27	0.0001
CONC*SEX	3	1.94569808	0.64856603	3.76	0.0323
CAN_AGT*SEX	1	1.41186989	1.41186989	8.19	0.0113
DILUENT*CONC*SEX	3	0.69711887	0.23237296	1.35	0.2943
DILUENT*CAN_AGT*SEX	1	1.42230705	1.42230705	8.25	0.0111
CONC*CAN_AGT*SEX	3	2.64254694	0.88084898	5.11	0.0114
DILUE*CONC*CAN_A*SEX	3	0.83701514	0.27900505	1.62	0.2246

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	10.23743666	10.23743666	59.37	0.0001
CONC	3	3.00604044	1.00201348	5.81	0.0070
CAN_AGT	1	0.00078954	0.00078954	0.00	0.9469
DILUENT*CONC	3	1.77620962	0.59206987	3.43	0.0424
DILUENT*CAN_AGT	1	1.21652419	1.21652419	7.05	0.0173
CONC*CAN_AGT	3	1.79566223	0.59855408	3.47	0.0410
DILUENT*CONC*CAN_AGT	3	1.29258449	0.43086150	2.50	0.0967
TANK(DILU*CONC*CAN_)	16	13.11333477	0.81958342	4.75	0.0017
SEX	1	13.93935523	13.93935523	80.84	0.0001
DILUENT*SEX	1	4.70310639	4.70310639	27.27	0.0001

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Type III SS	Mean Square	F Value	Pr > F
CONC*SEX	3	1.94569808	0.64856603	3.76	0.0323
CAN_AGT*SEX	1	1.41186989	1.41186989	8.19	0.0113
DILUENT*CONC*SEX	3	0.69711887	0.23237296	1.35	0.2943
DILUENT*CAN_AGT*SEX	1	1.42230705	1.42230705	8.25	0.0111
CONC*CAN_AGT*SEX	3	2.64254694	0.88084898	5.11	0.0114
DILUE*CONC*CAN_A*SEX	3	0.83701514	0.27900505	1.62	0.2246

Tests of Hypotheses using the Type III MS for
TANK(DILU*CONC*CAN_) as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	10.23743666	10.23743666	12.49	0.0028
CONC	3	3.00604044	1.00201348	1.22	0.3338
CAN_AGT	1	0.00078954	0.00078954	0.00	0.9756
DILUENT*CONC	3	1.77620962	0.59206987	0.72	0.5532
DILUENT*CAN_AGT	1	1.21652419	1.21652419	1.48	0.2408
CONC*CAN_AGT	3	1.79566223	0.59855408	0.73	0.5488
DILUENT*CONC*CAN_AGT	3	1.29258449	0.43086150	0.53	0.6709

----------------------------------- MONTH=9 -----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	WGT LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
apg	517.438411	0.0030
creek	477.066392	

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	LEN LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
apg	28.6767205	0.0028
creek	27.8768206	

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	WGT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
0	484.915940	1	.	0.4796	0.7974	0.0210
1	496.734580	2	0.4796	.	0.3393	0.0851
5	480.652885	3	0.7974	0.3393	.	0.0123
25	526.706202	4	0.0210	0.0851	0.0123	.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	LEN LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
0	28.0458820	1	.	0.6399	0.5720	0.0857
1	28.1985055	2	0.6399	.	0.9215	0.1943
5	28.2305308	3	0.5720	0.9215	.	0.2276
25	28.6321639	4	0.0857	0.1943	0.2276	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	WGT LSMEAN	LSMEAN Number
apg	0	512.212332	1
apg	1	511.109314	2
apg	5	508.496016	3
apg	25	537.935983	4
creek	0	457.619548	5
creek	1	482.359845	6
creek	5	452.809754	7
creek	25	515.476420	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.9625	0.8742	0.2817	0.0311	0.2144	0.0205	0.8894
2	0.9625	.	0.9113	0.2624	0.0341	0.2311	0.0225	0.8524
3	0.8742	0.9113	.	0.2205	0.0426	0.2744	0.0283	0.7663
4	0.2817	0.2624	0.2205	.	0.0031	0.0285	0.0020	0.3452
5	0.0311	0.0341	0.0426	0.0031	.	0.2999	0.8376	0.0234
6	0.2144	0.2311	0.2744	0.0285	0.2999	.	0.2189	0.1708
7	0.0205	0.0225	0.0283	0.0020	0.8376	0.2189	.	0.0153
8	0.8894	0.8524	0.7663	0.3452	0.0234	0.1708	0.0153	.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CONC	LEN LSMEAN	LSMEAN Number
apg	0	28.5461064	1
apg	1	28.6400736	2
apg	5	28.7706733	3
apg	25	28.7500286	4
creek	0	27.5456575	5
creek	1	27.7569375	6
creek	5	27.6903883	7
creek	25	28.5142992	8

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CONC
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
1	.	0.8382	0.6266	0.6584	0.0420	0.1004	0.0770	0.9449
2	0.8382	.	0.7767	0.8112	0.0279	0.0688	0.0521	0.7847
3	0.6266	0.7767	.	0.9642	0.0156	0.0397	0.0297	0.5790
4	0.6584	0.8112	0.9642	.	0.0171	0.0434	0.0325	0.6097
5	0.0420	0.0279	0.0156	0.0171	.	0.6470	0.7533	0.0481
6	0.1004	0.0688	0.0397	0.0434	0.6470	.	0.8850	0.1137
7	0.0770	0.0521	0.0297	0.0325	0.7533	0.8850	.	0.0875
8	0.9449	0.7847	0.5790	0.6097	0.0481	0.1137	0.0875	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	WGT LSMEAN	LSMEAN Number
0	DEN	497.312618	1
0	NONE	472.519262	2
1	DEN	489.615377	3
1	NONE	503.853782	4
5	DEN	470.640346	5
5	NONE	490.665424	6
25	DEN	544.178741	7
25	NONE	509.233663	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.2989	0.7432	0.7806	0.2650	0.7771	0.0594	0.6127
2	0.2989	.	0.4698	0.1936	0.9362	0.4434	0.0068	0.1314
3	0.7432	0.4698	.	0.5462	0.4233	0.9643	0.0311	0.4081
4	0.7806	0.1936	0.5462	.	0.1696	0.5758	0.0999	0.8187
5	0.2650	0.9362	0.4233	0.1696	.	0.3986	0.0058	0.1141
6	0.7771	0.4434	0.9643	0.5758	0.3986	.	0.0341	0.4331
7	0.0594	0.0068	0.0311	0.0999	0.0058	0.0341	.	0.1497

------------------------------- MONTH=9 -------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT
Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8
8	0.6127	0.1314	0.4081	0.8187	0.1141	0.4331	0.1497	.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	LEN LSMEAN	LSMEAN Number
0	DEN	28.0759454	1
0	NONE	28.0158186	2
1	DEN	28.0016865	3
1	NONE	28.3953246	4
5	DEN	28.1322742	5
5	NONE	28.3287873	6
25	DEN	28.8831268	7
25	NONE	28.3812011	8

Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.8960	0.8717	0.4906	0.9025	0.5842	0.0935	0.5097
2	0.8960	.	0.9755	0.4142	0.8002	0.4992	0.0734	0.4314
3	0.8717	0.9755	.	0.3974	0.7767	0.4803	0.0693	0.4141
4	0.4906	0.4142	0.3974	.	0.5693	0.8850	0.2972	0.9755
5	0.9025	0.8002	0.7767	0.5693	.	0.6700	0.1166	0.5900
6	0.5842	0.4992	0.4803	0.8850	0.6700	.	0.2384	0.9093
7	0.0935	0.0734	0.0693	0.2972	0.1166	0.2384	.	0.2839
8	0.5097	0.4314	0.4141	0.9755	0.5900	0.9093	0.2839	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

----------------------------------- MONTH=9 -----------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
apg	DEN	F	543.741330	1
apg	DEN	M	507.642039	2
apg	NONE	F	519.705388	3
apg	NONE	M	498.664888	4
creek	DEN	F	527.106881	5
creek	DEN	M	423.256832	6
creek	NONE	F	505.005074	7
creek	NONE	M	452.896780	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.1375	0.3134	0.0687	0.4817	0.0001	0.1129	0.0012
2	0.1375	.	0.6085	0.7026	0.4117	0.0021	0.9105	0.0306
3	0.3134	0.6085	.	0.3757	0.7527	0.0007	0.5334	0.0106
4	0.0687	0.7026	0.3757	.	0.2359	0.0049	0.7872	0.0649
5	0.4817	0.4117	0.7527	0.2359	.	0.0004	0.3527	0.0054
6	0.0001	0.0021	0.0007	0.0049	0.0004	.	0.0027	0.2176
7	0.1129	0.9105	0.5334	0.7872	0.3527	0.0027	.	0.0384
8	0.0012	0.0306	0.0106	0.0649	0.0054	0.2176	0.0384	.

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

DILUENT	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
apg	DEN	F	29.0061404	1
apg	DEN	M	28.6160163	2
apg	NONE	F	28.7385206	3
apg	NONE	M	28.3462047	4
creek	DEN	F	28.7708176	5
creek	DEN	M	26.7000586	6
creek	NONE	F	28.4583760	7
creek	NONE	M	27.5780303	8

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUENT*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
1	.	0.4015	0.5626	0.1642	0.6103	0.0001	0.2438	0.0061
2	0.4015	.	0.7901	0.5595	0.7368	0.0006	0.7322	0.0357
3	0.5626	0.7901	.	0.3989	0.9440	0.0004	0.5447	0.0208
4	0.1642	0.5595	0.3989	.	0.3622	0.0022	0.8074	0.1091
5	0.6103	0.7368	0.9440	0.3622	.	0.0003	0.4999	0.0180
6	0.0001	0.0006	0.0004	0.0022	0.0003	.	0.0013	0.0703
7	0.2438	0.7322	0.5447	0.8074	0.4999	0.0013	.	0.0696
8	0.0061	0.0357	0.0208	0.1091	0.0180	0.0703	0.0696	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Standard Errors and Probabilities calculated using the Type III MS for
TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
0	DEN	F	525.148261	1
0	DEN	M	469.476976	2
0	NONE	F	510.219643	3
0	NONE	M	434.818881	4
1	DEN	F	535.028373	5
1	DEN	M	444.202381	6
1	NONE	F	527.201664	7
1	NONE	M	480.505900	8
5	DEN	F	499.534101	9
5	DEN	M	441.746591	10
5	NONE	F	495.176190	11
5	NONE	M	486.154657	12
25	DEN	F	581.985687	13
25	DEN	M	506.371795	14
25	NONE	F	516.823427	15
25	NONE	M	501.643899	16

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8	9
1	.	0.1076	0.6537	0.0138	0.7661	0.0247	0.9506	0.1905	0.4443
2	0.1076	.	0.2301	0.3043	0.0619	0.4502	0.0962	0.7400	0.3710
3	0.6537	0.2301	.	0.0346	0.4585	0.0603	0.6102	0.3764	0.7477
4	0.0138	0.3043	0.0346	.	0.0073	0.7775	0.0121	0.1809	0.0650
5	0.7661	0.0619	0.4585	0.0073	.	0.0133	0.8136	0.1144	0.2932
6	0.0247	0.4502	0.0603	0.7775	0.0133	.	0.0218	0.2827	0.1096
7	0.9506	0.0962	0.6102	0.0121	0.8136	0.0218	.	0.1720	0.4094
8	0.1905	0.7400	0.3764	0.1809	0.1144	0.2827	0.1720	.	0.5682
9	0.4443	0.3710	0.7477	0.0650	0.2932	0.1096	0.4094	0.5682	.
10	0.0212	0.4083	0.0523	0.8347	0.0114	0.9410	0.0187	0.2526	0.0959
11	0.3724	0.4428	0.6512	0.0831	0.2400	0.1381	0.3413	0.6593	0.8955
12	0.2499	0.6165	0.4718	0.1355	0.1540	0.2172	0.2268	0.8648	0.6875
13	0.1010	0.0033	0.0430	0.0004	0.1697	0.0007	0.1128	0.0068	0.0225
14	0.5733	0.2752	0.9077	0.0436	0.3932	0.0751	0.5326	0.4399	0.8368
15	0.8020	0.1664	0.8423	0.0231	0.5849	0.0409	0.7547	0.2825	0.6038
16	0.4821	0.3393	0.7962	0.0575	0.3218	0.0977	0.4453	0.5266	0.9493

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16
1	0.0212	0.3724	0.2499	0.1010	0.5733	0.8020	0.4821
2	0.4083	0.4428	0.6165	0.0033	0.2752	0.1664	0.3393
3	0.0523	0.6512	0.4718	0.0430	0.9077	0.8423	0.7962
4	0.8347	0.0831	0.1355	0.0004	0.0436	0.0231	0.0575
5	0.0114	0.2400	0.1540	0.1697	0.3932	0.5849	0.3218
6	0.9410	0.1381	0.2172	0.0007	0.0751	0.0409	0.0977
7	0.0187	0.3413	0.2268	0.1128	0.5326	0.7547	0.4453
8	0.2526	0.6593	0.8648	0.0068	0.4399	0.2825	0.5266
9	0.0959	0.8955	0.6875	0.0225	0.8368	0.6038	0.9493
10	.	0.1213	0.1927	0.0006	0.0653	0.0353	0.0853
11	0.1213	.	0.7859	0.0172	0.7362	0.5168	0.8455
12	0.1927	0.7859	.	0.0097	0.5446	0.3616	0.6417
13	0.0006	0.0172	0.0097	.	0.0342	0.0633	0.0256
14	0.0653	0.7362	0.5446	0.0342	.	0.7531	0.8867
15	0.0353	0.5168	0.3616	0.0633	0.7531	.	0.6483
16	0.0853	0.8455	0.6417	0.0256	0.8867	0.6483	.

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for TANK(DILU*CONC*CAN_) as an Error term

CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
0	DEN	F	28.4957707	1
0	DEN	M	27.6561200	2
0	NONE	F	28.7580357	3
0	NONE	M	27.2736014	4
1	DEN	F	28.8430556	5
1	DEN	M	27.1603175	6
1	NONE	F	28.8905180	7
1	NONE	M	27.9001311	8
5	DEN	F	28.9452303	9
5	DEN	M	27.3193182	10
5	NONE	F	28.3230159	11
5	NONE	M	28.3345588	12
25	DEN	F	29.2698593	13
25	DEN	M	28.4963942	14
25	NONE	F	28.4222236	15
25	NONE	M	28.3401786	16

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2081	0.6875	0.0743	0.5949	0.0533	0.5461	0.3660	0.4927
2	0.2081	.	0.1045	0.5585	0.0822	0.4499	0.0718	0.7081	0.0612
3	0.6875	0.1045	.	0.0340	0.8960	0.0239	0.8387	0.1989	0.7737
4	0.0743	0.5585	0.0340	.	0.0261	0.8618	0.0225	0.3423	0.0189
5	0.5949	0.0822	0.8960	0.0261	.	0.0182	0.9418	0.1602	0.8752
6	0.0533	0.4499	0.0239	0.8618	0.0182	.	0.0157	0.2648	0.0132
7	0.5461	0.0718	0.8387	0.0225	0.9418	0.0157	.	0.1414	0.9329
8	0.3660	0.7081	0.1989	0.3423	0.1602	0.2648	0.1414	.	0.1221
9	0.4927	0.0612	0.7737	0.0189	0.8752	0.0132	0.9329	0.1221	.
10	0.0847	0.6060	0.0391	0.9440	0.0301	0.8070	0.0259	0.3777	0.0218
11	0.7907	0.3130	0.5065	0.1207	0.4285	0.0881	0.3885	0.5183	0.3455
12	0.8044	0.3050	0.5177	0.1169	0.4386	0.0853	0.3980	0.5071	0.3543
13	0.2441	0.0227	0.4357	0.0066	0.5144	0.0046	0.5617	0.0481	0.6190
14	0.9992	0.2078	0.6882	0.0742	0.5956	0.0532	0.5468	0.3655	0.4933
15	0.9100	0.2488	0.6071	0.0917	0.5203	0.0662	0.4750	0.4267	0.4259
16	0.8111	0.3011	0.5232	0.1151	0.4436	0.0839	0.4026	0.5017	0.3586

----------------------------------- MONTH=9 -----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	10	11	12	13	14	15	16
1	0.0847	0.7907	0.8044	0.2441	0.9992	0.9100	0.8111
2	0.6060	0.3130	0.3050	0.0227	0.2078	0.2488	0.3011
3	0.0391	0.5065	0.5177	0.4357	0.6882	0.6071	0.5232
4	0.9440	0.1207	0.1169	0.0066	0.0742	0.0917	0.1151
5	0.0301	0.4285	0.4386	0.5144	0.5956	0.5203	0.4436
6	0.8070	0.0881	0.0853	0.0046	0.0532	0.0662	0.0839
7	0.0259	0.3885	0.3980	0.5617	0.5468	0.4750	0.4026
8	0.3777	0.5183	0.5071	0.0481	0.3655	0.4267	0.5017
9	0.0218	0.3455	0.3543	0.6190	0.4933	0.4259	0.3586
10	.	0.1365	0.1323	0.0077	0.0846	0.1042	0.1303
11	0.1365	.	0.9858	0.1585	0.7900	0.8788	0.9789
12	0.1323	0.9858	.	0.1634	0.8036	0.8928	0.9931
13	0.0077	0.1585	0.1634	.	0.2445	0.2041	0.1658
14	0.0846	0.7900	0.8036	0.2445	.	0.9092	0.8103
15	0.1042	0.8788	0.8928	0.2041	0.9092	.	0.8996
16	0.1303	0.9789	0.9931	0.1658	0.8103	0.8996	.

NOTE: To ensure overall protection level, only probabilities associated with
pre-planned comparisons should be used.

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
F	523.889668	0.0001
M	470.615135	

SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN1=LSMEAN2
F	28.7434636	0.0001
M	27.8100775	

DILUENT	SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
apg	F	531.723359	1	.	0.0096	0.1265	0.0001
apg	M	503.153464	2	0.0096	.	0.2029	0.0001
creek	F	516.055978	3	0.1265	0.2029	.	0.0001
creek	M	438.076806	4	0.0001	0.0001	0.0001	.

DILUENT	SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
apg	F	28.8723305	1	.	0.0170	0.0983	0.0001
apg	M	28.4811105	2	0.0170	.	0.3767	0.0001
creek	F	28.6145968	3	0.0983	0.3767	.	0.0001
creek	M	27.1390445	4	0.0001	0.0001	0.0001	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

CONC	SEX	WGT LSMEAN	LSMEAN Number
0	F	517.683952	1
0	M	452.147928	2
1	F	531.115019	3
1	M	462.354141	4
5	F	497.355146	5
5	M	463.950624	6
25	F	549.404557	7
25	M	504.007847	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.0002	0.3430	0.0010	0.1585	0.0012	0.0347	0.3345
2	0.0002	.	0.0001	0.4685	0.0046	0.4032	0.0001	0.0017
3	0.3430	0.0001	.	0.0001	0.0258	0.0002	0.2019	0.0661
4	0.0010	0.4685	0.0001	.	0.0215	0.9090	0.0001	0.0080
5	0.1585	0.0046	0.0258	0.0215	.	0.0272	0.0016	0.6349
6	0.0012	0.4032	0.0002	0.9090	0.0272	.	0.0001	0.0101
7	0.0347	0.0001	0.2019	0.0001	0.0016	0.0001	.	0.0045
8	0.3345	0.0017	0.0661	0.0080	0.6349	0.0101	0.0045	.

CONC	SEX	LEN LSMEAN	LSMEAN Number
0	F	28.6269032	1
0	M	27.4648607	2
1	F	28.8667868	3
1	M	27.5302243	4
5	F	28.6341231	5
5	M	27.8269385	6
25	F	28.8460415	7
25	M	28.4182864	8

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8
1	.	0.0001	0.2649	0.0001	0.9727	0.0014	0.3069	0.3300
2	0.0001	.	0.0001	0.7570	0.0001	0.1004	0.0001	0.0003
3	0.2649	0.0001	.	0.0001	0.2790	0.0001	0.9217	0.0463
4	0.0001	0.7570	0.0001	.	0.0001	0.1722	0.0001	0.0006
5	0.9727	0.0001	0.2790	0.0001	.	0.0013	0.3226	0.3140
6	0.0014	0.1004	0.0001	0.1722	0.0013	.	0.0002	0.0116

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8
7	0.3069	0.0001	0.9217	0.0001	0.3226	0.0002	.	0.0560
8	0.3300	0.0003	0.0463	0.0006	0.3140	0.0116	0.0560	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

CAN_AGT	SEX	WGT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
DEN	F	535.424106	1	.	0.0001	0.0305	0.0001
DEN	M	465.449436	2	0.0001	.	0.0002	0.3035
NONE	F	512.355231	3	0.0305	0.0002	.	0.0017
NONE	M	475.780834	4	0.0001	0.3035	0.0017	.

CAN_AGT	SEX	LEN LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
DEN	F	28.8884790	1	.	0.0001	0.0657	0.0001
DEN	M	27.6580375	2	0.0001	.	0.0001	0.0549
NONE	F	28.5984483	3	0.0657	0.0001	.	0.0005
NONE	M	27.9621175	4	0.0001	0.0549	0.0005	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
0	DEN	F	525.148261	1
0	DEN	M	469.476976	2
0	NONE	F	510.219643	3
0	NONE	M	434.818881	4
1	DEN	F	535.028373	5
1	DEN	M	444.202381	6
1	NONE	F	527.201664	7
1	NONE	M	480.505900	8
5	DEN	F	499.534101	9
5	DEN	M	441.746591	10
5	NONE	F	495.176190	11
5	NONE	M	486.154657	12
25	DEN	F	581.985687	13
25	DEN	M	506.371795	14
25	NONE	F	516.823427	15
25	NONE	M	501.643899	16

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.0112	0.4536	0.0003	0.6182	0.0007	0.9172	0.0355	0.2061
2	0.0112	.	0.0523	0.0936	0.0039	0.2119	0.0090	0.5783	0.1416
3	0.4536	0.0523	.	0.0013	0.2200	0.0037	0.3952	0.1459	0.5901
4	0.0003	0.0936	0.0013	.	0.0001	0.6358	0.0002	0.0319	0.0042
5	0.6182	0.0039	0.2200	0.0001	.	0.0003	0.6925	0.0127	0.0866
6	0.0007	0.2119	0.0037	0.6358	0.0003	.	0.0006	0.0802	0.0117
7	0.9172	0.0090	0.3952	0.0002	0.6925	0.0006	.	0.0288	0.1738
8	0.0355	0.5783	0.1459	0.0319	0.0127	0.0802	0.0288	.	0.3422
9	0.2061	0.1416	0.5901	0.0042	0.0866	0.0117	0.1738	0.3422	.
10	0.0006	0.1729	0.0028	0.7262	0.0002	0.9010	0.0005	0.0635	0.0090
11	0.1426	0.2047	0.4502	0.0068	0.0571	0.0185	0.1189	0.4614	0.8254
12	0.0621	0.4035	0.2335	0.0178	0.0230	0.0464	0.0508	0.7751	0.5011
13	0.0099	0.0001	0.0020	0.0001	0.0280	0.0001	0.0124	0.0001	0.0006
14	0.3484	0.0759	0.8456	0.0020	0.1598	0.0056	0.2998	0.2019	0.7296
15	0.6741	0.0269	0.7385	0.0007	0.3629	0.0018	0.6007	0.0801	0.3869
16	0.2441	0.1174	0.6650	0.0034	0.1052	0.0093	0.2071	0.2929	0.9149

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16
1	0.0006	0.1426	0.0621	0.0099	0.3484	0.6741	0.2441
2	0.1729	0.2047	0.4035	0.0001	0.0759	0.0269	0.1174
3	0.0028	0.4502	0.2335	0.0020	0.8456	0.7385	0.6650
4	0.7262	0.0068	0.0178	0.0001	0.0020	0.0007	0.0034
5	0.0002	0.0571	0.0230	0.0280	0.1598	0.3629	0.1052
6	0.9010	0.0185	0.0464	0.0001	0.0056	0.0018	0.0093
7	0.0005	0.1189	0.0508	0.0124	0.2998	0.6007	0.2071
8	0.0635	0.4614	0.7751	0.0001	0.2019	0.0801	0.2929
9	0.0090	0.8254	0.5011	0.0006	0.7296	0.3869	0.9149
10	.	0.0143	0.0363	0.0001	0.0043	0.0014	0.0071
11	0.0143	.	0.6488	0.0004	0.5726	0.2819	0.7436
12	0.0363	0.6488	.	0.0002	0.3137	0.1342	0.4372
13	0.0001	0.0004	0.0002	.	0.0013	0.0040	0.0008
14	0.0043	0.5726	0.3137	0.0013	.	0.5982	0.8109
15	0.0014	0.2819	0.1342	0.0040	0.5982	.	0.4462
16	0.0071	0.7436	0.4372	0.0008	0.8109	0.4462	.

CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
0	DEN	F	28.4957707	1
0	DEN	M	27.6561200	2
0	NONE	F	28.7580357	3
0	NONE	M	27.2736014	4
1	DEN	F	28.8430556	5
1	DEN	M	27.1603175	6
1	NONE	F	28.8905180	7
1	NONE	M	27.9001311	8
5	DEN	F	28.9452303	9
5	DEN	M	27.3193182	10
5	NONE	F	28.3230159	11
5	NONE	M	28.3345588	12
25	DEN	F	29.2698593	13
25	DEN	M	28.4963942	14
25	NONE	F	28.4222236	15
25	NONE	M	28.3401786	16

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect CONC*CAN_AGT*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8	9
1	.	0.0114	0.3850	0.0007	0.2542	0.0003	0.1976	0.0595	0.1454
2	0.0114	.	0.0017	0.2111	0.0009	0.1107	0.0007	0.4182	0.0005
3	0.3850	0.0017	.	0.0001	0.7759	0.0001	0.6579	0.0100	0.5328
4	0.0007	0.2111	0.0001	.	0.0001	0.7047	0.0001	0.0487	0.0001
5	0.2542	0.0009	0.7759	0.0001	.	0.0001	0.8736	0.0054	0.7324
6	0.0003	0.1107	0.0001	0.7047	0.0001	.	0.0001	0.0228	0.0001
7	0.1976	0.0007	0.6579	0.0001	0.8736	0.0001	.	0.0039	0.8545
8	0.0595	0.4182	0.0100	0.0487	0.0054	0.0228	0.0039	.	0.0026
9	0.1454	0.0005	0.5328	0.0001	0.7324	0.0001	0.8545	0.0026	.
10	0.0010	0.2682	0.0002	0.8782	0.0001	0.5956	0.0001	0.0654	0.0001
11	0.5645	0.0373	0.1579	0.0025	0.0956	0.0011	0.0712	0.1691	0.0501
12	0.5906	0.0345	0.1685	0.0023	0.1025	0.0010	0.0765	0.1584	0.0540
13	0.0180	0.0001	0.1005	0.0001	0.1654	0.0001	0.2147	0.0003	0.2853
14	0.9983	0.0113	0.3861	0.0007	0.2550	0.0003	0.1983	0.0592	0.1459
15	0.8054	0.0190	0.2696	0.0012	0.1710	0.0006	0.1303	0.0944	0.0939
16	0.6035	0.0332	0.1739	0.0022	0.1061	0.0010	0.0793	0.1534	0.0560

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16
1	0.0010	0.5645	0.5906	0.0180	0.9983	0.8054	0.6035
2	0.2682	0.0373	0.0345	0.0001	0.0113	0.0190	0.0332
3	0.0002	0.1579	0.1685	0.1005	0.3861	0.2696	0.1739
4	0.8782	0.0025	0.0023	0.0001	0.0007	0.0012	0.0022
5	0.0001	0.0956	0.1025	0.1654	0.2550	0.1710	0.1061
6	0.5956	0.0011	0.0010	0.0001	0.0003	0.0006	0.0010
7	0.0001	0.0712	0.0765	0.2147	0.1983	0.1303	0.0793
8	0.0654	0.1691	0.1584	0.0003	0.0592	0.0944	0.1534
9	0.0001	0.0501	0.0540	0.2853	0.1459	0.0939	0.0560
10	.	0.0035	0.0032	0.0001	0.0010	0.0017	0.0031
11	0.0035	.	0.9691	0.0053	0.5631	0.7399	0.9541
12	0.0032	0.9691	.	0.0058	0.5891	0.7691	0.9850
13	0.0001	0.0053	0.0058	.	0.0180	0.0107	0.0060
14	0.0010	0.5631	0.5891	0.0180	.	0.8038	0.6020
15	0.0017	0.7399	0.7691	0.0107	0.8038	.	0.7835
16	0.0031	0.9541	0.9850	0.0060	0.6020	0.7835	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

DILUENT	CONC	CAN_AGT	SEX	WGT LSMEAN	LSMEAN Number
apg	0	DEN	F	572.109023	1
apg	0	DEN	M	535.741830	2
apg	0	NONE	F	497.010714	3
apg	0	NONE	M	443.987762	4
apg	1	DEN	F	499.792857	5
apg	1	DEN	M	494.761905	6
apg	1	NONE	F	552.416149	7
apg	1	NONE	M	497.466346	8
apg	5	DEN	F	517.405702	9
apg	5	DEN	M	479.175000	10
apg	5	NONE	F	509.202381	11
apg	5	NONE	M	528.200980	12
apg	25	DEN	F	585.657738	13
apg	25	DEN	M	520.889423	14
apg	25	NONE	F	520.192308	15
apg	25	NONE	M	525.004464	16
creek	0	DEN	F	478.187500	17
creek	0	DEN	M	403.212121	18
creek	0	NONE	F	523.428571	19
creek	0	NONE	M	425.650000	20
creek	1	DEN	F	570.263889	21
creek	1	DEN	M	393.642857	22
creek	1	NONE	F	501.987179	23
creek	1	NONE	M	463.545455	24
creek	5	DEN	F	481.662500	25
creek	5	DEN	M	404.318182	26
creek	5	NONE	F	481.150000	27
creek	5	NONE	M	444.108333	28
creek	25	DEN	F	578.313636	29
creek	25	DEN	M	491.854167	30
creek	25	NONE	F	513.454545	31
creek	25	NONE	M	478.283333	32

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2044	0.0148	0.0003	0.0182	0.0125	0.4841	0.0153	0.0640
2	0.2044	.	0.1780	0.0042	0.2094	0.1555	0.5526	0.1828	0.5142
3	0.0148	0.1780	.	0.0717	0.9206	0.9358	0.0610	0.9870	0.4689
4	0.0003	0.0042	0.0717	.	0.0593	0.0833	0.0012	0.0695	0.0167
5	0.0182	0.2094	0.9206	0.0593	.	0.8571	0.0736	0.9336	0.5308
6	0.0125	0.1555	0.9358	0.0833	0.8571	.	0.0522	0.9228	0.4222
7	0.4841	0.5526	0.0610	0.0012	0.0736	0.0522	.	0.0629	0.2210

----------------------------------- MONTH=9 -----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	1	2	3	4	5	6	7	8	9
8	0.0153	0.1828	0.9870	0.0695	0.9336	0.9228	0.0629	.	0.4787
9	0.0640	0.5142	0.4689	0.0167	0.5308	0.4222	0.2210	0.4787	.
10	0.0038	0.0563	0.5256	0.2188	0.4641	0.5786	0.0170	0.5153	0.1833
11	0.0361	0.3487	0.6633	0.0305	0.7366	0.6066	0.1355	0.6751	0.7692
12	0.1297	0.7873	0.2732	0.0074	0.3168	0.2414	0.3914	0.2800	0.6997
13	0.6288	0.0882	0.0053	0.0001	0.0065	0.0045	0.2441	0.0055	0.0245
14	0.0809	0.5964	0.3979	0.0129	0.4540	0.3560	0.2683	0.4067	0.9007
15	0.0772	0.5795	0.4115	0.0136	0.4688	0.3686	0.2582	0.4205	0.9205
16	0.1059	0.7012	0.3236	0.0095	0.3727	0.2875	0.3335	0.3313	0.7858
17	0.0035	0.0526	0.5033	0.2314	0.4434	0.5550	0.0158	0.4932	0.1729
18	0.0001	0.0002	0.0036	0.1574	0.0029	0.0042	0.0001	0.0034	0.0007
19	0.0956	0.6602	0.3508	0.0107	0.4026	0.3125	0.3073	0.3590	0.8293
20	0.0001	0.0010	0.0195	0.5142	0.0159	0.0230	0.0003	0.0189	0.0042
21	0.9473	0.2272	0.0169	0.0003	0.0208	0.0143	0.5254	0.0175	0.0725
22	0.0001	0.0001	0.0017	0.0857	0.0014	0.0020	0.0001	0.0017	0.0004
23	0.0214	0.2372	0.8586	0.0510	0.9374	0.7960	0.0852	0.8714	0.5826
24	0.0011	0.0183	0.2411	0.4870	0.2058	0.2728	0.0052	0.2350	0.0677
25	0.0046	0.0667	0.5843	0.1894	0.5189	0.6401	0.0204	0.5733	0.2119
26	0.0001	0.0002	0.0039	0.1683	0.0031	0.0046	0.0001	0.0037	0.0008
27	0.0044	0.0644	0.5720	0.1952	0.5073	0.6272	0.0196	0.5611	0.2057
28	0.0003	0.0042	0.0723	0.9966	0.0598	0.0840	0.0012	0.0701	0.0169
29	0.8243	0.1410	0.0093	0.0002	0.0114	0.0078	0.3601	0.0096	0.0416
30	0.0100	0.1299	0.8536	0.1008	0.7764	0.9171	0.0426	0.8408	0.3664
31	0.0487	0.4294	0.5581	0.0224	0.6259	0.5062	0.1755	0.5689	0.8875
32	0.0036	0.0529	0.5054	0.2301	0.4453	0.5572	0.0159	0.4953	0.1739

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.0038	0.0361	0.1297	0.6288	0.0809	0.0772	0.1059	0.0035	0.0001
2	0.0563	0.3487	0.7873	0.0882	0.5964	0.5795	0.7012	0.0526	0.0002
3	0.5256	0.6633	0.2732	0.0053	0.3979	0.4115	0.3236	0.5033	0.0036
4	0.2188	0.0305	0.0074	0.0001	0.0129	0.0136	0.0095	0.2314	0.1574
5	0.4641	0.7366	0.3168	0.0065	0.4540	0.4688	0.3727	0.4434	0.0029
6	0.5786	0.6066	0.2414	0.0045	0.3560	0.3686	0.2875	0.5550	0.0042
7	0.0170	0.1355	0.3914	0.2441	0.2683	0.2582	0.3335	0.0158	0.0001
8	0.5153	0.6751	0.2800	0.0055	0.4067	0.4205	0.3313	0.4932	0.0034
9	0.1833	0.7692	0.6997	0.0245	0.9007	0.9205	0.7858	0.1729	0.0007
10	.	0.2908	0.0935	0.0013	0.1486	0.1551	0.1149	0.9718	0.0138
11	0.2908	.	0.4994	0.0133	0.6764	0.6946	0.5734	0.2758	0.0014

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	10	11	12	13	14	15	16	17	18
12	0.0935	0.4994	.	0.0529	0.7936	0.7745	0.9089	0.0876	0.0003
13	0.0013	0.0133	0.0529	.	0.0315	0.0300	0.0423	0.0012	0.0001
14	0.1486	0.6764	0.7936	0.0315	.	0.9801	0.8829	0.1399	0.0006
15	0.1551	0.6946	0.7745	0.0300	0.9801	.	0.8632	0.1460	0.0006
16	0.1149	0.5734	0.9089	0.0423	0.8829	0.8632	.	0.1079	0.0004
17	0.9718	0.2758	0.0876	0.0012	0.1399	0.1460	0.1079	.	0.0149
18	0.0138	0.0014	0.0003	0.0001	0.0006	0.0006	0.0004	0.0149	.
19	0.1270	0.6119	0.8643	0.0378	0.9275	0.9077	0.9550	0.1193	0.0005
20	0.0693	0.0078	0.0018	0.0001	0.0032	0.0034	0.0023	0.0741	0.4263
21	0.0044	0.0411	0.1455	0.5832	0.0914	0.0873	0.1192	0.0041	0.0001
22	0.0067	0.0007	0.0002	0.0001	0.0003	0.0003	0.0002	0.0072	0.7323
23	0.4188	0.7963	0.3545	0.0077	0.5015	0.5172	0.4147	0.3994	0.0024
24	0.5775	0.1162	0.0318	0.0004	0.0533	0.0560	0.0400	0.6016	0.0433
25	0.9290	0.3313	0.1098	0.0016	0.1728	0.1801	0.1344	0.9010	0.0115
26	0.0150	0.0015	0.0004	0.0001	0.0006	0.0007	0.0005	0.0162	0.9684
27	0.9436	0.3227	0.1063	0.0016	0.1676	0.1747	0.1302	0.9155	0.0119
28	0.2203	0.0308	0.0075	0.0001	0.0130	0.0137	0.0095	0.2329	0.1563
29	0.0024	0.0230	0.0870	0.7927	0.0530	0.0505	0.0703	0.0022	0.0001
30	0.6508	0.5369	0.2047	0.0036	0.3065	0.3179	0.2454	0.6258	0.0053
31	0.2303	0.8790	0.5990	0.0183	0.7903	0.8095	0.6799	0.2178	0.0010
32	0.9745	0.2773	0.0882	0.0013	0.1407	0.1469	0.1085	0.9973	0.0148

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	19	20	21	22	23	24	25	26	27
1	0.0956	0.0001	0.9473	0.0001	0.0214	0.0011	0.0046	0.0001	0.0044
2	0.6602	0.0010	0.2272	0.0001	0.2372	0.0183	0.0667	0.0002	0.0644
3	0.3508	0.0195	0.0169	0.0017	0.8586	0.2411	0.5843	0.0039	0.5720
4	0.0107	0.5142	0.0003	0.0857	0.0510	0.4870	0.1894	0.1683	0.1952
5	0.4026	0.0159	0.0208	0.0014	0.9374	0.2058	0.5189	0.0031	0.5073
6	0.3125	0.0230	0.0143	0.0020	0.7960	0.2728	0.6401	0.0046	0.6272
7	0.3073	0.0003	0.5254	0.0001	0.0852	0.0052	0.0204	0.0001	0.0196
8	0.3590	0.0189	0.0175	0.0017	0.8714	0.2350	0.5733	0.0037	0.5611
9	0.8293	0.0042	0.0725	0.0004	0.5826	0.0677	0.2119	0.0008	0.2057
10	0.1270	0.0693	0.0044	0.0067	0.4188	0.5775	0.9290	0.0150	0.9436
11	0.6119	0.0078	0.0411	0.0007	0.7963	0.1162	0.3313	0.0015	0.3227
12	0.8643	0.0018	0.1455	0.0002	0.3545	0.0318	0.1098	0.0004	0.1063
13	0.0378	0.0001	0.5832	0.0001	0.0077	0.0004	0.0016	0.0001	0.0016
14	0.9275	0.0032	0.0914	0.0003	0.5015	0.0533	0.1728	0.0006	0.1676
15	0.9077	0.0034	0.0873	0.0003	0.5172	0.0560	0.1801	0.0007	0.1747

MONTH=9

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	19	20	21	22	23	24	25	26	27
16	0.9550	0.0023	0.1192	0.0002	0.4147	0.0400	0.1344	0.0005	0.1302
17	0.1193	0.0741	0.0041	0.0072	0.3994	0.6016	0.9010	0.0162	0.9155
18	0.0005	0.4263	0.0001	0.7323	0.0024	0.0433	0.0115	0.9684	0.0119
19	.	0.0026	0.1078	0.0002	0.4468	0.0447	0.1482	0.0005	0.1436
20	0.0026	.	0.0001	0.2613	0.0135	0.1870	0.0585	0.4490	0.0606
21	0.1078	0.0001	.	0.0001	0.0245	0.0013	0.0053	0.0001	0.0051
22	0.0002	0.2613	0.0001	.	0.0012	0.0217	0.0056	0.7029	0.0058
23	0.4468	0.0135	0.0245	0.0012	.	0.1811	0.4704	0.0026	0.4594
24	0.0447	0.1870	0.0013	0.0217	0.1811	.	0.5192	0.0468	0.5310
25	0.1482	0.0585	0.0053	0.0056	0.4704	0.5192	.	0.0125	0.9854
26	0.0005	0.4490	0.0001	0.7029	0.0026	0.0468	0.0125	.	0.0130
27	0.1436	0.0606	0.0051	0.0058	0.4594	0.5310	0.9854	0.0130	.
28	0.0108	0.5115	0.0003	0.0850	0.0514	0.4897	0.1908	0.1671	0.1966
29	0.0632	0.0001	0.7734	0.0001	0.0135	0.0007	0.0029	0.0001	0.0028
30	0.2676	0.0284	0.0115	0.0025	0.7172	0.3184	0.7157	0.0058	0.7021
31	0.7215	0.0056	0.0553	0.0005	0.6821	0.0882	0.2644	0.0011	0.2571
32	0.1200	0.0736	0.0041	0.0072	0.4012	0.5992	0.9037	0.0161	0.9182

Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

i/j	28	29	30	31	32
1	0.0003	0.8243	0.0100	0.0487	0.0036
2	0.0042	0.1410	0.1299	0.4294	0.0529
3	0.0723	0.0093	0.8536	0.5581	0.5054
4	0.9966	0.0002	0.1008	0.0224	0.2301
5	0.0598	0.0114	0.7764	0.6259	0.4453
6	0.0840	0.0078	0.9171	0.5062	0.5572
7	0.0012	0.3601	0.0426	0.1755	0.0159
8	0.0701	0.0096	0.8408	0.5689	0.4953
9	0.0169	0.0416	0.3664	0.8875	0.1739
10	0.2203	0.0024	0.6508	0.2303	0.9745
11	0.0308	0.0230	0.5369	0.8790	0.2773
12	0.0075	0.0870	0.2047	0.5990	0.0882
13	0.0001	0.7927	0.0036	0.0183	0.0013
14	0.0130	0.0530	0.3065	0.7903	0.1407
15	0.0137	0.0505	0.3179	0.8095	0.1469
16	0.0095	0.0703	0.2454	0.6799	0.1085
17	0.2329	0.0022	0.6258	0.2178	0.9973
18	0.1563	0.0001	0.0053	0.0010	0.0148
19	0.0108	0.0632	0.2676	0.7215	0.1200

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: WGT

i/j	28	29	30	31	32
20	0.5115	0.0001	0.0284	0.0056	0.0736
21	0.0003	0.7734	0.0115	0.0553	0.0041
22	0.0850	0.0001	0.0025	0.0005	0.0072
23	0.0514	0.0135	0.7172	0.6821	0.4012
24	0.4897	0.0007	0.3184	0.0882	0.5992
25	0.1908	0.0029	0.7157	0.2644	0.9037
26	0.1671	0.0001	0.0058	0.0011	0.0161
27	0.1966	0.0028	0.7021	0.2571	0.9182
28	.	0.0002	0.1016	0.0226	0.2317
29	0.0002	.	0.0063	0.0313	0.0022
30	0.1016	0.0063	.	0.4435	0.6282
31	0.0226	0.0313	0.4435	.	0.2190
32	0.2317	0.0022	0.6282	0.2190	.

DILUENT	CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
apg	0	DEN	F	29.1165414	1
apg	0	DEN	M	28.5849673	2
apg	0	NONE	F	28.9357143	3
apg	0	NONE	M	27.5472028	4
apg	1	DEN	F	28.7000000	5
apg	1	DEN	M	28.4238095	6
apg	1	NONE	F	29.1816770	7
apg	1	NONE	M	28.2548077	8
apg	5	DEN	F	29.3092105	9
apg	5	DEN	M	28.5250000	10
apg	5	NONE	F	28.4960317	11
apg	5	NONE	M	28.7524510	12
apg	25	DEN	F	28.8988095	13
apg	25	DEN	M	28.9302885	14
apg	25	NONE	F	28.3406593	15
apg	25	NONE	M	28.8303571	16
creek	0	DEN	F	27.8750000	17
creek	0	DEN	M	26.7272727	18
creek	0	NONE	F	28.5803571	19
creek	0	NONE	M	27.0000000	20
creek	1	DEN	F	28.9861111	21
creek	1	DEN	M	25.8968254	22

------------------------------------ MONTH=9 ------------------------------------

General Linear Models Procedure
Least Squares Means

DILUENT	CONC	CAN_AGT	SEX	LEN LSMEAN	LSMEAN Number
creek	1	NONE	F	28.5993590	23
creek	1	NONE	M	27.5454545	24
creek	5	DEN	F	28.5812500	25
creek	5	DEN	M	26.1136364	26
creek	5	NONE	F	28.1500000	27
creek	5	NONE	M	27.9166667	28
creek	25	DEN	F	29.6409091	29
creek	25	DEN	M	28.0625000	30
creek	25	NONE	F	28.5037879	31
creek	25	NONE	M	27.8500000	32

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6	7	8	9
1	.	0.2188	0.6690	0.0016	0.3307	0.1147	0.8773	0.0545	0.6489
2	0.2188	.	0.4108	0.0237	0.7853	0.7031	0.1700	0.4382	0.1003
3	0.6690	0.4108	.	0.0041	0.5782	0.2355	0.5619	0.1206	0.3818
4	0.0016	0.0237	0.0041	.	0.0135	0.0509	0.0012	0.1077	0.0006
5	0.3307	0.7853	0.5782	0.0135	.	0.5155	0.2631	0.2996	0.1617
6	0.1147	0.7031	0.2355	0.0509	0.5155	.	0.0867	0.6894	0.0488
7	0.8773	0.1700	0.5619	0.0012	0.2631	0.0867	.	0.0403	0.7627
8	0.0545	0.4382	0.1206	0.1077	0.2996	0.6894	0.0403	.	0.0219
9	0.6489	0.1003	0.3818	0.0006	0.1617	0.0488	0.7627	0.0219	.
10	0.1735	0.8870	0.3374	0.0316	0.6790	0.8106	0.1334	0.5245	0.0772
11	0.1546	0.8331	0.3054	0.0363	0.6300	0.8641	0.1182	0.5694	0.0679
12	0.3936	0.6920	0.6649	0.0104	0.9011	0.4403	0.3167	0.2482	0.1987
13	0.6072	0.4608	0.9303	0.0050	0.6386	0.2695	0.5055	0.1405	0.3377
14	0.6598	0.4179	0.9897	0.0042	0.5869	0.2403	0.5534	0.1233	0.3750
15	0.0801	0.5645	0.1711	0.0741	0.3996	0.8438	0.0599	0.8388	0.0331
16	0.5006	0.5628	0.8029	0.0070	0.7576	0.3421	0.4100	0.1848	0.2658
17	0.0087	0.1066	0.0212	0.4414	0.0644	0.2049	0.0062	0.3740	0.0033
18	0.0001	0.0004	0.0001	0.0658	0.0002	0.0009	0.0001	0.0020	0.0001
19	0.2150	0.9913	0.4048	0.0243	0.7770	0.7111	0.1669	0.4445	0.0984
20	0.0001	0.0015	0.0003	0.2061	0.0008	0.0034	0.0001	0.0081	0.0001
21	0.7575	0.3484	0.9049	0.0032	0.5007	0.1945	0.6440	0.0973	0.4479
22	0.0001	0.0001	0.0001	0.0011	0.0001	0.0001	0.0001	0.0001	0.0001
23	0.2309	0.9728	0.4298	0.0221	0.8116	0.6781	0.1799	0.4189	0.1067
24	0.0016	0.0235	0.0041	0.9967	0.0134	0.0505	0.0012	0.1069	0.0006
25	0.2157	0.9930	0.4059	0.0241	0.7786	0.7096	0.1675	0.4433	0.0987
26	0.0001	0.0001	0.0001	0.0033	0.0001	0.0001	0.0001	0.0001	0.0001
27	0.0334	0.3104	0.0767	0.1659	0.2039	0.5190	0.0244	0.8040	0.0131
28	0.0107	0.1271	0.0260	0.3868	0.0775	0.2397	0.0077	0.4274	0.0040
29	0.2248	0.0217	0.1088	0.0001	0.0377	0.0098	0.2851	0.0042	0.4361

------------------------------- MONTH=9 -------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	1	2	3	4	5	6	7	8	9
30	0.0219	0.2264	0.0517	0.2325	0.1443	0.3971	0.0159	0.6495	0.0084
31	0.1595	0.8475	0.3137	0.0350	0.6429	0.8497	0.1221	0.5572	0.0703
32	0.0076	0.0958	0.0188	0.4764	0.0575	0.1860	0.0055	0.3441	0.0029

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	10	11	12	13	14	15	16	17	18
1	0.1735	0.1546	0.3936	0.6072	0.6598	0.0801	0.5006	0.0087	0.0001
2	0.8870	0.8331	0.6920	0.4608	0.4179	0.5645	0.5628	0.1066	0.0004
3	0.3374	0.3054	0.6649	0.9303	0.9897	0.1711	0.8029	0.0212	0.0001
4	0.0316	0.0363	0.0104	0.0050	0.0042	0.0741	0.0070	0.4414	0.0658
5	0.6790	0.6300	0.9011	0.6386	0.5869	0.3996	0.7576	0.0644	0.0002
6	0.8106	0.8641	0.4403	0.2695	0.2403	0.8438	0.3421	0.2049	0.0009
7	0.1334	0.1182	0.3167	0.5055	0.5534	0.0599	0.4100	0.0062	0.0001
8	0.5245	0.5694	0.2482	0.1405	0.1233	0.8388	0.1848	0.3740	0.0020
9	0.0772	0.0679	0.1987	0.3377	0.3750	0.0331	0.2658	0.0033	0.0001
10	.	0.9452	0.5914	0.3814	0.3436	0.6630	0.4728	0.1371	0.0005
11	0.9452	.	0.5456	0.3465	0.3112	0.7132	0.4326	0.1542	0.0006
12	0.5914	0.5456	.	0.7291	0.6742	0.3361	0.8535	0.0507	0.0002
13	0.3814	0.3465	0.7291	.	0.9405	0.1977	0.8711	0.0254	0.0001
14	0.3436	0.3112	0.6742	0.9405	.	0.1748	0.8129	0.0218	0.0001
15	0.6630	0.7132	0.3361	0.1977	0.1748	.	0.2555	0.2787	0.0013
16	0.4728	0.4326	0.8535	0.8711	0.8129	0.2555	.	0.0352	0.0001
17	0.1371	0.1542	0.0507	0.0254	0.0218	0.2787	0.0352	.	0.0138
18	0.0005	0.0006	0.0002	0.0001	0.0001	0.0013	0.0001	0.0138	.
19	0.8956	0.8416	0.6841	0.4543	0.4118	0.5718	0.5556	0.1087	0.0004
20	0.0021	0.0024	0.0007	0.0003	0.0003	0.0053	0.0004	0.0512	0.5207
21	0.2832	0.2552	0.5814	0.8361	0.8947	0.1397	0.7125	0.0166	0.0001
22	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0628
23	0.8601	0.8067	0.7172	0.4812	0.4372	0.5421	0.5857	0.1003	0.0004
24	0.0314	0.0360	0.0103	0.0049	0.0042	0.0735	0.0070	0.4390	0.0664
25	0.8939	0.8400	0.6856	0.4556	0.4130	0.5704	0.5570	0.1083	0.0004
26	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006	0.1589
27	0.3799	0.4169	0.1662	0.0902	0.0786	0.6523	0.1208	0.5172	0.0035
28	0.1623	0.1820	0.0613	0.0310	0.0266	0.3224	0.0428	0.9213	0.0112
29	0.0162	0.0140	0.0482	0.0929	0.1063	0.0064	0.0687	0.0006	0.0001
30	0.2818	0.3120	0.1161	0.0611	0.0530	0.5125	0.0830	0.6577	0.0054
31	0.9599	0.9853	0.5577	0.3556	0.3197	0.6996	0.4431	0.1495	0.0006
32	0.1236	0.1393	0.0451	0.0225	0.0193	0.2546	0.0313	0.9527	0.0157

------------------------------- MONTH=9 -------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	19	20	21	22	23	24	25	26	27
1	0.2150	0.0001	0.7575	0.0001	0.2309	0.0016	0.2157	0.0001	0.0334
2	0.9913	0.0015	0.3484	0.0001	0.9728	0.0235	0.9930	0.0001	0.3104
3	0.4048	0.0003	0.9049	0.0001	0.4298	0.0041	0.4059	0.0001	0.0767
4	0.0243	0.2061	0.0032	0.0011	0.0221	0.9967	0.0241	0.0033	0.1659
5	0.7770	0.0008	0.5007	0.0001	0.8116	0.0134	0.7786	0.0001	0.2039
6	0.7111	0.0034	0.1945	0.0001	0.6781	0.0505	0.7096	0.0001	0.5190
7	0.1669	0.0001	0.6440	0.0001	0.1799	0.0012	0.1675	0.0001	0.0244
8	0.4445	0.0081	0.0973	0.0001	0.4189	0.1069	0.4433	0.0001	0.8040
9	0.0984	0.0001	0.4479	0.0001	0.1067	0.0006	0.0987	0.0001	0.0131
10	0.8956	0.0021	0.2832	0.0001	0.8601	0.0314	0.8939	0.0001	0.3799
11	0.8416	0.0024	0.2552	0.0001	0.8067	0.0360	0.8400	0.0001	0.4169
12	0.6841	0.0007	0.5814	0.0001	0.7172	0.0103	0.6856	0.0001	0.1662
13	0.4543	0.0003	0.8361	0.0001	0.4812	0.0049	0.4556	0.0001	0.0902
14	0.4118	0.0003	0.8947	0.0001	0.4372	0.0042	0.4130	0.0001	0.0786
15	0.5718	0.0053	0.1397	0.0001	0.5421	0.0735	0.5704	0.0001	0.6523
16	0.5556	0.0004	0.7125	0.0001	0.5857	0.0070	0.5570	0.0001	0.1208
17	0.1087	0.0512	0.0166	0.0002	0.1003	0.4390	0.1083	0.0006	0.5172
18	0.0004	0.5207	0.0001	0.0628	0.0004	0.0664	0.0004	0.1589	0.0035
19	.	0.0016	0.3431	0.0001	0.9641	0.0240	0.9983	0.0001	0.3154
20	0.0016	.	0.0002	0.0172	0.0014	0.2075	0.0015	0.0486	0.0137
21	0.3431	0.0002	.	0.0001	0.3655	0.0032	0.3441	0.0001	0.0612
22	0.0001	0.0172	0.0001	.	0.0001	0.0011	0.0001	0.6087	0.0001
23	0.9641	0.0014	0.3655	0.0001	.	0.0219	0.9658	0.0001	0.2952
24	0.0240	0.2075	0.0032	0.0011	0.0219	.	0.0239	0.0033	0.1648
25	0.9983	0.0015	0.3441	0.0001	0.9658	0.0239	.	0.0001	0.3145
26	0.0001	0.0486	0.0001	0.6087	0.0001	0.0033	0.0001	.	0.0002
27	0.3154	0.0137	0.0612	0.0001	0.2952	0.1648	0.3145	0.0002	.
28	0.1295	0.0422	0.0203	0.0002	0.1197	0.3846	0.1291	0.0005	0.5820
29	0.0212	0.0001	0.1344	0.0001	0.0233	0.0001	0.0213	0.0001	0.0024
30	0.2303	0.0210	0.0409	0.0001	0.2144	0.2310	0.2295	0.0002	0.8358
31	0.8560	0.0023	0.2625	0.0001	0.8209	0.0347	0.8544	0.0001	0.4068
32	0.0977	0.0575	0.0147	0.0002	0.0900	0.4739	0.0973	0.0007	0.4804

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Least Squares Means

Least Squares Means for effect DILUE*CONC*CAN_A*SEX
Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

Dependent Variable: LEN

i/j	28	29	30	31	32
1	0.0107	0.2248	0.0219	0.1595	0.0076
2	0.1271	0.0217	0.2264	0.8475	0.0958
3	0.0260	0.1088	0.0517	0.3137	0.0188
4	0.3868	0.0001	0.2325	0.0350	0.4764
5	0.0775	0.0377	0.1443	0.6429	0.0575
6	0.2397	0.0098	0.3971	0.8497	0.1860
7	0.0077	0.2851	0.0159	0.1221	0.0055
8	0.4274	0.0042	0.6495	0.5572	0.3441
9	0.0040	0.4361	0.0084	0.0703	0.0029
10	0.1623	0.0162	0.2818	0.9599	0.1236
11	0.1820	0.0140	0.3120	0.9853	0.1393
12	0.0613	0.0482	0.1161	0.5577	0.0451
13	0.0310	0.0929	0.0611	0.3556	0.0225
14	0.0266	0.1063	0.0530	0.3197	0.0193
15	0.3224	0.0064	0.5125	0.6996	0.2546
16	0.0428	0.0687	0.0830	0.4431	0.0313
17	0.9213	0.0006	0.6577	0.1495	0.9527
18	0.0112	0.0001	0.0054	0.0006	0.0157
19	0.1295	0.0212	0.2303	0.8560	0.0977
20	0.0422	0.0001	0.0210	0.0023	0.0575
21	0.0203	0.1344	0.0409	0.2625	0.0147
22	0.0002	0.0001	0.0001	0.0001	0.0002
23	0.1197	0.0233	0.2144	0.8209	0.0900
24	0.3846	0.0001	0.2310	0.0347	0.4739
25	0.1291	0.0213	0.2295	0.8544	0.0973
26	0.0005	0.0001	0.0002	0.0001	0.0007
27	0.5820	0.0024	0.8358	0.4068	0.4804
28	.	0.0007	0.7300	0.1766	0.8745
29	0.0007	.	0.0016	0.0146	0.0005
30	0.7300	0.0016	.	0.3037	0.6158
31	0.1766	0.0146	0.3037	.	0.1350
32	0.8745	0.0005	0.6158	0.1350	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RWGT

Moments

N	64	Sum Wgts	64
Mean	0	Sum	0
Std Dev	14.61554	Variance	213.6141
Skewness	0	Kurtosis	-0.45739
USS	13457.69	CSS	13457.69
CV	.	Std Mean	1.826943
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	64	Num > 0	32
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	-1	Pr>=|S|	0.9947
W:Normal	0.953087	Pr<W	0.0371

Quantiles(Def=5)

100% Max	28.43542	99%	28.43542
75% Q3	7.034389	95%	26.66944
50% Med	-227E-15	90%	19.56456
25% Q1	-7.03439	10%	-19.5646
0% Min	-28.4354	5%	-26.6694
		1%	-28.4354
Range	56.87083		
Q3-Q1	14.06878		
Mode	-18.0936		

Extremes

Lowest	Obs	Highest	Obs
-28.4354(	42)	20.9926(	32)
-28.4354(	43)	26.66944(	53)
-26.6694(	55)	26.66944(	56)
-26.6694(	54)	28.43542(	41)
-20.9926(	31)	28.43542(	44)

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RWGT

```
Stem Leaf                     #             Boxplot
   2 7788                     4                0
   2 0011                     4                |
   1 8888                     4                |
   1 44                       2                |
   0 556688                   6             +------+
   0 001122334444            12             *--+--*
  -0 444433221100            12             |      |
  -0 886655                   6             +------+
  -1 44                       2                |
  -1 8888                     4                |
  -2 1100                     4                |
  -2 8877                     4                0
     ----+----+----+----+
 Multiply Stem.Leaf by 10**+1
```

```
                     Normal Probability Plot
 27.5+                                                   *****   *
     |                                                 ****
     |                                            *****
     |                                          +***
     |                                       +***
     |                                   ******
     |                              ******
     |                            ****
     |                         +***+
     |                      *****
     |                   ++**
-27.5+  *  *****
      +----+----+----+----+----+----+----+----+----+----+
          -2        -1         0        +1        +2
```

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RLEN

Moments

N	64	Sum Wgts	64
Mean	0	Sum	0
Std Dev	0.362797	Variance	0.131622
Skewness	0	Kurtosis	-0.28726
USS	8.292161	CSS	8.292161
CV	.	Std Mean	0.04535
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	64	Num > 0	32
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	-7	Pr>=|S|	0.9631
W:Normal	0.965382	Pr<W	0.1700

Quantiles(Def=5)

100% Max	0.760417	99%	0.760417
75% Q3	0.293795	95%	0.705556
50% Med	-533E-17	90%	0.393398
25% Q1	-0.29379	10%	-0.3934
0% Min	-0.76042	5%	-0.70556
		1%	-0.76042
Range	1.520833		
Q3-Q1	0.587589		
Mode	-0.17331		

Extremes

Lowest	Obs	Highest	Obs
-0.76042(	42)	0.425(	64)
-0.76042(	43)	0.705556(	13)
-0.70556(	15)	0.705556(	16)
-0.70556(	14)	0.760417(	41)
-0.425(	62)	0.760417(	44)

```
---------------------------------- MONTH=6 ----------------------------------

                         Univariate Procedure

Variable=RLEN

          Stem Leaf                     #             Boxplot
             7 1166                     4                |
             6                                           |
             5                                           |
             4 22                       2                |
             3 2233778899              10                |
             2 2277                     4             +-----+
             1 77                       2             |     |
             0 1155556688              10             *--+--*
            -0 8866555511              10             |     |
            -1 77                       2             |     |
            -2 7722                     4             +-----+
            -3 9988773322              10                |
            -4 22                       2                |
            -5                                           |
            -6                                           |
            -7 6611                     4                |
               ----+----+----+----+
           Multiply Stem.Leaf by 10**-1
```

```
                        Normal Probability Plot
       0.75+                                          **  ++++*
           |                                           +++
           |                                        +++
       0.45+                                      ++**
           |                                 *******
           |                               **++
       0.15+                             +**
           |                          *****
           |                      *****
      -0.15+                     **+
           |                  ++**
           |             *******
      -0.45+           ****
           |          +++
           |       +++
      -0.75+ *+++  **
             +----+----+----+----+----+----+----+----+----+----+
                 -2        -1         0        +1        +2
```

---------------------------------- MONTH=9 ----------------------------------

Univariate Procedure

Variable=RWGT

Moments

N	64	Sum Wgts	64
Mean	0	Sum	0
Std Dev	13.85269	Variance	191.8971
Skewness	0	Kurtosis	-0.9582
USS	12089.52	CSS	12089.52
CV	.	Std Mean	1.731587
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	64	Num > 0	32
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	-0.5	Pr>=|S|	0.9974
W:Normal	0.94207	Pr<W	0.0082

Quantiles(Def=5)

100% Max	23.61071	99%	23.61071
75% Q3	9.324948	95%	22.3582
50% Med	-114E-15	90%	19.65697
25% Q1	-9.32495	10%	-19.657
0% Min	-23.6107	5%	-22.3582
		1%	-23.6107
Range	47.22143		
Q3-Q1	18.6499		
Mode	-10.4819		

Extremes

Lowest	Obs	Highest	Obs
-23.6107(	3)	21.42163(	14)
-23.6107(	2)	22.3582(	38)
-22.3582(	37)	22.3582(	39)
-22.3582(	40)	23.61071(	4)
-21.4216(	13)	23.61071(	1)

----------------------------------- MONTH=9 -----------------------------------

Univariate Procedure

Variable=RWGT

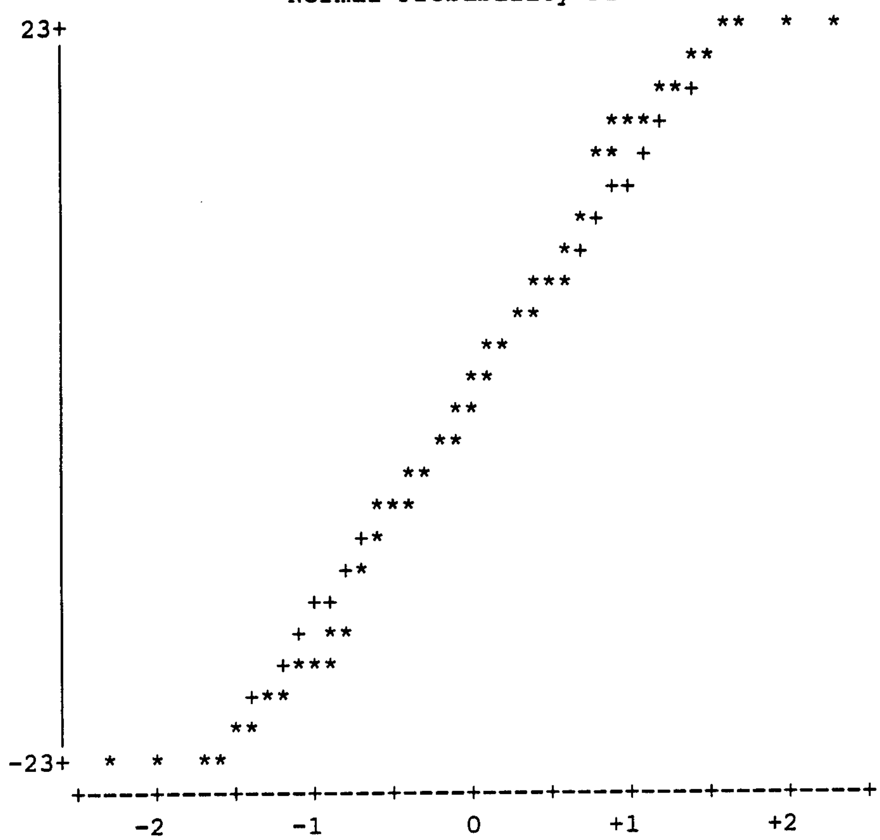
```
             Stem Leaf                     #             Boxplot
               22 4466                     4                |
               20 44                       2                |
               18 77                       2                |
               16 6655                     4                |
               14 22                       2                |
               12                                           |
               10 55                       2                |
                8 22                       2             +-----+
                6 5588                     4             |     |
                4 1122                     4             |     |
                2 1199                     4             |     |
                0 00                       2             *--+--*
               -0 00                       2             |     |
               -2 9911                     4             |     |
               -4 2211                     4             |     |
               -6 8855                     4             |     |
               -8 22                       2             +-----+
              -10 55                       2                |
              -12                                           |
              -14 22                       2                |
              -16 5566                     4                |
              -18 77                       2                |
              -20 44                       2                |
              -22 6644                     4                |
                  ----+----+----+----+
```

---------------------------------- MONTH=9 ----------------------------------

Univariate Procedure

Variable=RWGT

Normal Probability Plot



------------------------------------ MONTH=9 ------------------------------------

Univariate Procedure

Variable=RLEN

Moments

N	64	Sum Wgts	64
Mean	0	Sum	0
Std Dev	0.209268	Variance	0.043793
Skewness	0	Kurtosis	-1.198
USS	2.758977	CSS	2.758977
CV	.	Std Mean	0.026159
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	64	Num > 0	32
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	1.5	Pr>=|S|	0.9921
W:Normal	0.917623	Pr<W	0.0002

Quantiles(Def=5)

100% Max	0.32658	99%	0.32658
75% Q3	0.18839	95%	0.316193
50% Med	0	90%	0.297321
25% Q1	-0.18839	10%	-0.29732
0% Min	-0.32658	5%	-0.31619
		1%	-0.32658

Range	0.653159
Q3-Q1	0.376781
Mode	-0.30854

Extremes

Lowest	Obs	Highest	Obs
-0.32658(	60)	0.308543(	44)
-0.32658(	57)	0.316193(	24)
-0.31619(	23)	0.316193(	21)
-0.31619(	22)	0.32658(	58)
-0.30854(	43)	0.32658(	59)

```
------------------------------------ MONTH=9 ------------------------------------

                         Univariate Procedure

Variable=RLEN

                Stem Leaf                     #             Boxplot
                   3 00112233                 8                |
                   2 6677                     4                |
                   2 0011                     4                |
                   1 5588                     4             +-----+
                   1                                        |     |
                   0 557799                   6             |     |
                   0 223344                   6             *--+--*
                  -0 443322                   6             |     |
                  -0 997755                   6             |     |
                  -1                                        |     |
                  -1 8855                     4             +-----+
                  -2 1100                     4                |
                  -2 7766                     4                |
                  -3 33221100                 8                |
                     ----+----+----+----+
                 Multiply Stem.Leaf by 10**-1


                           Normal Probability Plot
                                                    ****   *   *
          0.325+                                ******+
               |                              ****+
               |                           *****+
               |                           +++
               |                         ***
               |                      ****
               |                    ***
               |                  ***
               |                +++
               |              +++**
               |            ++**
               |          +*****
         -0.325+  *  *  ***
                +----+----+----+----+----+----+----+----+----+----+
                    -2        -1         0        +1        +2
```

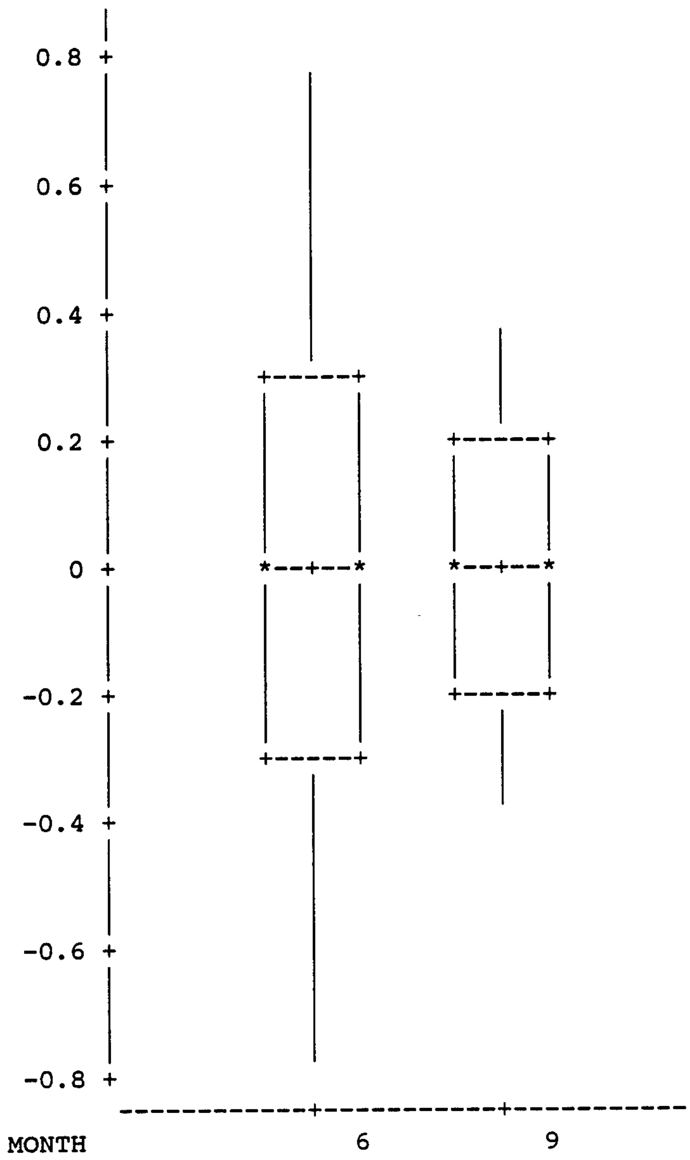
Univariate Procedure
Schematic Plots

Variable=RWGT

```
         |
      30 +
         |            0
         |            |
         |            |            |
      20 +            |            |
         |            |            |
         |            |            |
         |            |            |
      10 +            |         +-----+
         |         +-----+      |     |
         |         |     |      |     |
         |         |     |      |     |
       0 +         *--+--*      *--+--*
         |         |     |      |     |
         |         |     |      |     |
         |         +-----+      |     |
     -10 +            |         +-----+
         |            |            |
         |            |            |
         |            |            |
     -20 +            |            |
         |            |            |
         |            |
         |            0
     -30 +
          ------------+------------+-----------
MONTH                 6            9
```

Univariate Procedure
Schematic Plots

Variable=RLEN



OBS	MONTH	DILUENT	CONC	TANK	MNWGT	MNLEN	RMNWGT	RMNLEN
1	6	creek	0	1	374.350	26.1000	15.0000	0.02500
2	6	creek	0	2	344.350	26.0500	-15.0000	-0.02500
3	6	creek	0	3	371.857	26.8571	-4.8214	-0.14643
4	6	creek	0	4	381.500	27.1500	4.8214	0.14643
5	6	creek	1	5	389.950	26.7000	13.8000	0.57500
6	6	creek	1	6	362.350	25.5500	-13.8000	-0.57500
7	6	creek	1	7	380.632	26.0000	-2.5092	0.15000
8	6	creek	1	8	385.650	25.7000	2.5092	-0.15000
9	6	creek	5	9	414.526	26.6842	16.8584	0.29449
10	6	creek	5	10	380.810	26.0952	-16.8584	-0.29449
11	6	creek	5	11	352.650	26.0000	-5.5639	0.44444
12	6	creek	5	12	363.778	25.1111	5.5639	-0.44444
13	6	creek	25	13	407.300	26.1000	-6.3250	-0.02500
14	6	creek	25	14	419.950	26.1500	6.3250	0.02500
15	6	creek	25	15	408.350	25.2500	-1.4750	-0.27500
16	6	creek	25	16	411.300	25.8000	1.4750	0.27500
17	6	apg	0	17	385.600	26.7000	26.3000	0.42500
18	6	apg	0	18	333.000	25.8500	-26.3000	-0.42500
19	6	apg	0	19	435.263	29.9474	13.1579	1.00000
20	6	apg	0	20	408.947	27.9474	-13.1579	-1.00000
21	6	apg	1	21	392.650	27.8000	14.6250	0.47500
22	6	apg	1	22	363.400	26.8500	-14.6250	-0.47500
23	6	apg	1	23	406.050	27.3000	16.0750	0.22500
24	6	apg	1	24	373.900	26.8500	-16.0750	-0.22500
25	6	apg	5	25	385.550	27.6500	-6.2500	-0.27500
26	6	apg	5	26	398.050	28.2000	6.2500	0.27500
27	6	apg	5	27	359.667	27.9444	-41.0417	-0.37778
28	6	apg	5	28	441.750	28.7000	41.0417	0.37778
29	6	apg	25	29	381.900	27.9000	-8.6611	-0.02222
30	6	apg	25	30	399.222	27.9444	8.6611	0.02222
31	6	apg	25	31	397.400	27.8500	12.7750	0.77500
32	6	apg	25	32	371.850	26.3000	-12.7750	-0.77500
33	9	creek	0	1	507.944	28.1667	35.3264	0.39583
34	9	creek	0	2	437.292	27.3750	-35.3264	-0.39583
35	9	creek	0	3	421.037	26.8148	-31.9360	-0.70623
36	9	creek	0	4	484.909	28.2273	31.9360	0.70623
37	9	creek	1	5	491.583	28.3750	7.6830	0.27446
38	9	creek	1	6	476.217	27.8261	-7.6830	-0.27446
39	9	creek	1	7	439.889	26.7222	-11.5833	-0.27778
40	9	creek	1	8	463.056	27.2778	11.5833	0.27778
41	9	creek	5	9	451.833	27.5417	-13.2333	-0.49583
42	9	creek	5	10	478.300	28.5333	13.2333	0.49583
43	9	creek	5	11	491.063	28.4375	39.1979	0.81134
44	9	creek	5	12	412.667	26.8148	-39.1979	-0.81134
45	9	creek	25	13	512.037	28.6296	16.3995	0.45767
46	9	creek	25	14	479.238	27.7143	-16.3995	-0.45767
47	9	creek	25	15	521.913	28.5652	-15.9879	-0.32850
48	9	creek	25	16	553.889	29.2222	15.9879	0.32850
49	9	apg	0	17	454.031	28.3125	-13.4600	0.08308

OBS	MONTH	DILUENT	CONC	TANK	MNWGT	MNLEN	RMNWGT	RMNLEN
50	9	apg	0	18	480.951	28.1463	13.4600	-0.08308
51	9	apg	0	19	567.440	29.1600	11.4700	0.31611
52	9	apg	0	20	544.500	28.5278	-11.4700	-0.31611
53	9	apg	1	21	558.185	29.1852	30.4797	0.41517
54	9	apg	1	22	497.226	28.3548	-30.4797	-0.41517
55	9	apg	1	23	491.138	28.3103	-6.3134	-0.25659
56	9	apg	1	24	503.765	28.8235	6.3134	0.25659
57	9	apg	5	25	537.885	28.8077	19.8423	0.18956
58	9	apg	5	26	498.200	28.4286	-19.8423	-0.18956
59	9	apg	5	27	476.235	28.2059	-19.2886	-0.64706
60	9	apg	5	28	514.813	29.5000	19.2886	0.64706
61	9	apg	25	29	523.036	28.7143	1.1730	0.13300
62	9	apg	25	30	520.690	28.4483	-1.1730	-0.13300
63	9	apg	25	31	569.633	29.0667	14.5329	0.18198
64	9	apg	25	32	540.568	28.7027	-14.5329	-0.18198

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RMNWGT

Moments

N	32	Sum Wgts	32
Mean	0	Sum	0
Std Dev	16.26621	Variance	264.5896
Skewness	0	Kurtosis	0.783338
USS	8202.278	CSS	8202.278
CV	.	Std Mean	2.875487
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	32	Num > 0	16
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	0	Pr>=|S|	1.0000
W:Normal	0.982429	Pr<W	0.8896

Quantiles(Def=5)

100% Max	41.04167	99%	41.04167
75% Q3	12.96645	95%	26.3
50% Med	-256E-15	90%	16.075
25% Q1	-12.9664	10%	-16.075
0% Min	-41.0417	5%	-26.3
		1%	-41.0417
Range	82.08333		
Q3-Q1	25.93289		
Mode	-41.0417		

Extremes

Lowest	Obs	Highest	Obs
-41.0417(	27)	15(	1)
-26.3(	18)	16.075(	23)
-16.8584(	10)	16.8584(	9)
-16.075(	24)	26.3(	17)
-15(	2)	41.04167(	28)

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RMNWGT

```
Stem Leaf                     #             Boxplot
   4 1                        1                |
   3                                           |
   2 6                        1                |
   1 3345567                  7             +-----+
   0 1356669                  7             *--+--*
  -0 9666531                  7             |     |
  -1 7655433                  7             +-----+
  -2 6                        1                |
  -3                                           |
  -4 1                        1                |
     ----+----+----+----+
 Multiply Stem.Leaf by 10**+1
```

```
                     Normal Probability Plot
   45+                                                    *   +
     |                                                 ++++++
     |                                            ++*+++
   15+                                      *****+** *
     |                                 ******+
     |                            +******
  -15+                   *  **+*****
     |              ++*+++
     |         ++++++
  -45++    *
      +----+----+----+----+----+----+----+----+----+----+
           -2        -1         0        +1        +2
```

---------------------------------- MONTH=6 ----------------------------------

Univariate Procedure

Variable=RMNLEN

Moments

N	32	Sum Wgts	32
Mean	0	Sum	0
Std Dev	0.440822	Variance	0.194324
Skewness	0	Kurtosis	0.077776
USS	6.024058	CSS	6.024058
CV	.	Std Mean	0.077927
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	32	Num > 0	16
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	1	Pr>=|S|	0.9854
W:Normal	0.994028	Pr<W	0.9994

Quantiles(Def=5)

100% Max	1	99%	1
75% Q3	0.284743	95%	0.775
50% Med	-142E-16	90%	0.475
25% Q1	-0.28474	10%	-0.475
0% Min	-1	5%	-0.775
		1%	-1
Range	2		
Q3-Q1	0.569486		
Mode	-1		

Extremes

Lowest	Obs	Highest	Obs
-1(	20)	0.444444(	11)
-0.775(	32)	0.475(	21)
-0.575(	6)	0.575(	5)
-0.475(	22)	0.775(	31)
-0.44444(	12)	1(	19)

```
----------------------------------- MONTH=6 -----------------------------------

                         Univariate Procedure

Variable=RMNLEN

          Stem Leaf                    #             Boxplot
            10 0                       1                |
             8                                          |
             6 8                       1                |
             4 2488                    4                |
             2 28898                   5             +-----+
             0 22255                   5             *--+--*
            -0 55222                   5             |     |
            -2 89882                   5             +-----+
            -4 8842                    4                |
            -6 8                       1                |
            -8                                          |
           -10 0                       1                |
               ----+----+----+----+
           Multiply Stem.Leaf by 10**-1


                            Normal Probability Plot
        1.1+                                                  * +++
           |                                                ++++
           |                                            ++*++
           |                                       *+*+*+*
           |                                  *****+
           |                              *****
           |                          *****
           |                      +*****
           |                  *+*+*+*
           |              ++*++
           |          +*++
       -1.1++++
            +----+----+----+----+----+----+----+----+----+----+
                 -2        -1         0        +1        +2
```

MONTH=9

Univariate Procedure

Variable=RMNWGT

Moments

N	32	Sum Wgts	32
Mean	0	Sum	0
Std Dev	21.18607	Variance	448.8497
Skewness	0	Kurtosis	-0.82574
USS	13914.34	CSS	13914.34
CV	.	Std Mean	3.745204
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	32	Num > 0	16
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	0	Pr>=|S|	1.0000
W:Normal	0.96409	Pr<W	0.4113

Quantiles(Def=5)

100% Max	39.19792	99%	39.19792
75% Q3	15.2604	95%	35.32639
50% Med	-909E-15	90%	30.47969
25% Q1	-15.2604	10%	-30.4797
0% Min	-39.1979	5%	-35.3264
		1%	-39.1979
Range	78.39583		
Q3-Q1	30.52081		
Mode	-39.1979		

Extremes

Lowest	Obs	Highest	Obs
-39.1979(	12)	19.84231(	25)
-35.3264(	2)	30.47969(	21)
-31.936(	3)	31.93603(	4)
-30.4797(	22)	35.32639(	1)
-19.8423(	26)	39.19792(	11)

```
---------------------------------- MONTH=9 ----------------------------------

                           Univariate Procedure

Variable=RMNWGT

              Stem Leaf                     #             Boxplot
                 3 0259                     4                |
                 2 0                        1                |
                 1 12335669                 8             +-----+
                 0 168                      3             *--+--*
                -0 861                      3             |     |
                -1 96653321                 8             +-----+
                -2 0                        1                |
                -3 9520                     4                |
                   ----+----+----+----+
               Multiply Stem.Leaf by 10**+1


                          Normal Probability Plot
              35+                                     * ++*++    *
                 |                                  +++++
                 |                            ******* *
                 |                         ****+
                 |                     ++***
                 |                * *******
                 |            +++++
             -35+    *   ++*+* *
                  +----+----+----+----+----+----+----+----+----+----+
                      -2        -1         0        +1        +2
```

----------------------------------- MONTH=9 -----------------------------------

Univariate Procedure

Variable=RMNLEN

Moments

N	32	Sum Wgts	32
Mean	0	Sum	0
Std Dev	0.431045	Variance	0.1858
Skewness	0	Kurtosis	-0.91765
USS	5.759796	CSS	5.759796
CV	.	Std Mean	0.076199
T:Mean=0	0	Pr>|T|	1.0000
Num ^= 0	32	Num > 0	16
M(Sign)	0	Pr>=|M|	1.0000
Sgn Rank	0.5	Pr>=|S|	0.9927
W:Normal	0.967	Pr<W	0.4811

Quantiles(Def=5)

100% Max	0.811343	99%	0.811343
75% Q3	0.322307	95%	0.706229
50% Med	5.33E-15	90%	0.495833
25% Q1	-0.32231	10%	-0.49583
0% Min	-0.81134	5%	-0.70623
		1%	-0.81134
Range	1.622685		
Q3-Q1	0.644614		
Mode	-0.81134		

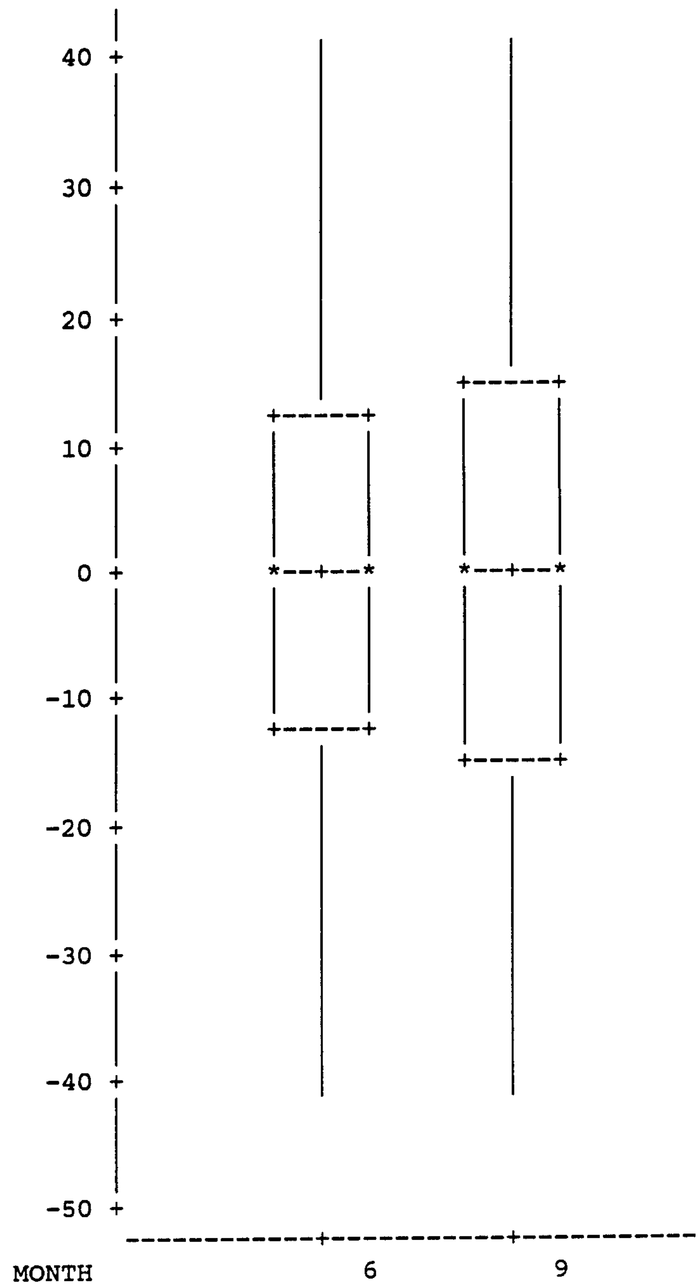
Extremes

Lowest	Obs	Highest	Obs
-0.81134(	12)	0.457672(	13)
-0.70623(	3)	0.495833(	10)
-0.64706(	27)	0.647059(	28)
-0.49583(	9)	0.706229(	4)
-0.45767(	14)	0.811343(	11)

```
----------------------------------- MONTH=9 ----------------------------------

                         Univariate Procedure

Variable=RMNLEN

           Stem Leaf                     #             Boxplot
              8 1                        1                |
              6 51                       2                |
              4 0260                     4                |
              2 67823                    5             +------+
              0 8389                     4             *--+--*
             -0 9838                     4             |      |
             -2 32876                    5             +------+
             -4 0620                     4                |
             -6 15                       2                |
             -8 1                        1                |
                ----+----+----+----+
            Multiply Stem.Leaf by 10**-1


                            Normal Probability Plot
        0.9+                                                  +++++
           |                                             *++++
           |                                        *+***+
        0.3+                                   *****+
           |                               ****+
           |                           +****
       -0.3+                       +*****
           |                   +***+*
           |              ++++*
       -0.9+         +++++
            +----+----+----+----+----+----+----+----+----+----+
                -2        -1         0        +1        +2
```

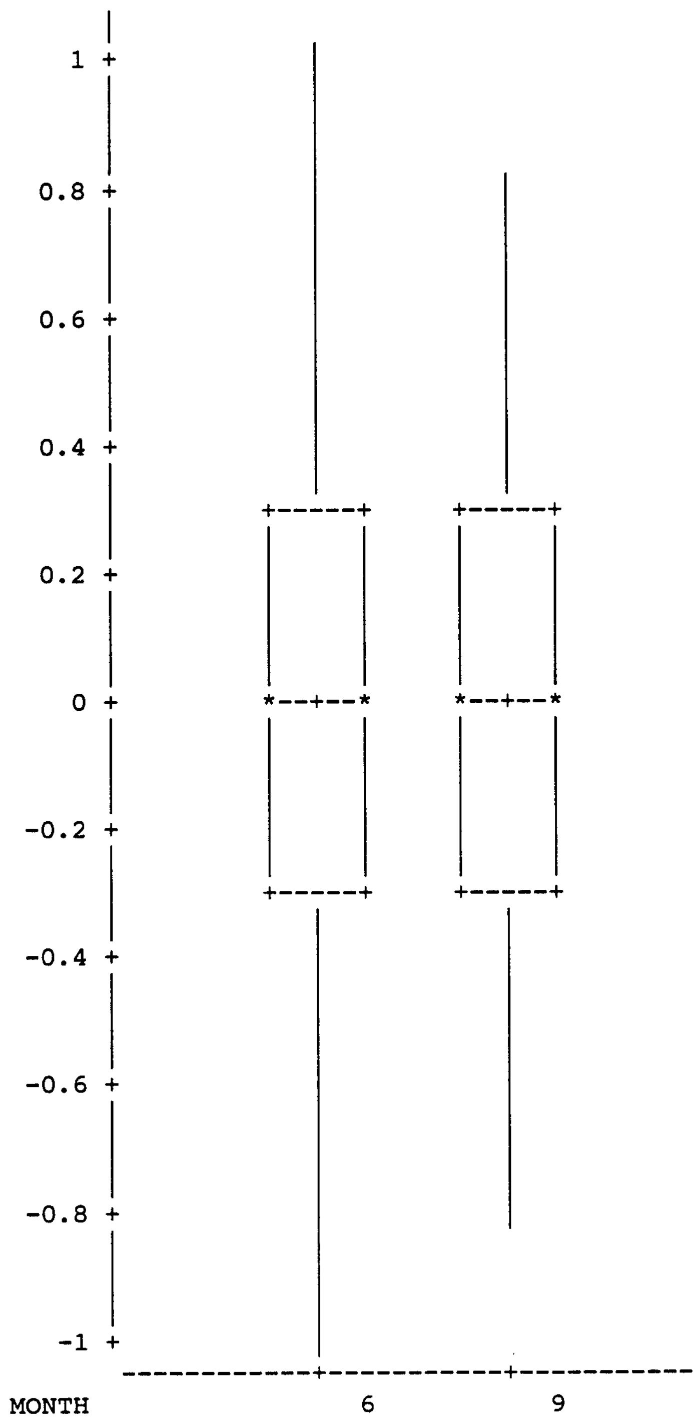
Univariate Procedure
Schematic Plots

Variable=RMNWGT



Univariate Procedure
Schematic Plots

Variable=RMNLEN



------------------------------------ MONTH=6 ------------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	2	apg creek
CONC	4	0 1 5 25
CAN_AGT	2	DEN NONE

Number of observations in by group = 16

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: ARMNWGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1137.2707435	94.7725620	0.86	0.6364
Error	3	331.1879166	110.3959722		
Corrected Total	15	1468.4586601			

R-Square	C.V.	Root MSE	ARMNWGT Mean
0.774466	81.91012	10.506949	12.827412

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	328.81247565	328.81247565	2.98	0.1828
CONC	3	226.99222669	75.66407556	0.69	0.6181
CAN_AGT	1	6.76054304	6.76054304	0.06	0.8205
DILUENT*CONC	3	20.46634982	6.82211661	0.06	0.9766
CONC*CAN_AGT	3	291.57782348	97.19260783	0.88	0.5405
DILUENT*CAN_AGT	1	262.66132484	262.66132484	2.38	0.2206

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	328.81247565	328.81247565	2.98	0.1828
CONC	3	226.99222669	75.66407556	0.69	0.6181
CAN_AGT	1	6.76054304	6.76054304	0.06	0.8205
DILUENT*CONC	3	20.46634982	6.82211661	0.06	0.9766
CONC*CAN_AGT	3	291.57782348	97.19260783	0.88	0.5405
DILUENT*CAN_AGT	1	262.66132484	262.66132484	2.38	0.2206

---------------------------------- MONTH=6 ----------------------------------

General Linear Models Procedure

Dependent Variable: ARMNLEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1.06489851	0.08874154	5.39	0.0958
Error	3	0.04937701	0.01645900		
Corrected Total	15	1.11427552			

R-Square	C.V.	Root MSE	ARMNLEN Mean
0.955687	37.25134	0.1282927	0.3443975

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	0.16802637	0.16802637	10.21	0.0495
CONC	3	0.03223586	0.01074529	0.65	0.6327
CAN_AGT	1	0.10191136	0.10191136	6.19	0.0886
DILUENT*CONC	3	0.28865328	0.09621776	5.85	0.0905
CONC*CAN_AGT	3	0.40060777	0.13353592	8.11	0.0596
DILUENT*CAN_AGT	1	0.07346387	0.07346387	4.46	0.1250

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	0.16802637	0.16802637	10.21	0.0495
CONC	3	0.03223586	0.01074529	0.65	0.6327
CAN_AGT	1	0.10191136	0.10191136	6.19	0.0886
DILUENT*CONC	3	0.28865328	0.09621776	5.85	0.0905
CONC*CAN_AGT	3	0.40060777	0.13353592	8.11	0.0596
DILUENT*CAN_AGT	1	0.07346387	0.07346387	4.46	0.1250

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DILUENT	2	apg creek
CONC	4	0 1 5 25
CAN_AGT	2	DEN NONE

Number of observations in by group = 16

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure

Dependent Variable: ARMNWGT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1452.9532595	121.0794383	1.12	0.5262
Error	3	323.5550595	107.8516865		
Corrected Total	15	1776.5083190			

R-Square	C.V.	Root MSE	ARMNWGT Mean
0.817870	57.71396	10.385167	17.994203

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	187.60424203	187.60424203	1.74	0.2788
CONC	3	404.01059118	134.67019706	1.25	0.4297
CAN_AGT	1	10.10110999	10.10110999	0.09	0.7796
DILUENT*CONC	3	450.99408637	150.33136212	1.39	0.3957
CONC*CAN_AGT	3	303.15583893	101.05194631	0.94	0.5207
DILUENT*CAN_AGT	1	97.08739097	97.08739097	0.90	0.4127

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	187.60424203	187.60424203	1.74	0.2788
CONC	3	404.01059118	134.67019706	1.25	0.4297
CAN_AGT	1	10.10110999	10.10110999	0.09	0.7796
DILUENT*CONC	3	450.99408637	150.33136212	1.39	0.3957
CONC*CAN_AGT	3	303.15583893	101.05194631	0.94	0.5207
DILUENT*CAN_AGT	1	97.08739097	97.08739097	0.90	0.4127

---------------------------------- MONTH=9 ----------------------------------

General Linear Models Procedure

Dependent Variable: ARMNLEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	0.63157095	0.05263091	7.66	0.0599
Error	3	0.02061491	0.00687164		
Corrected Total	15	0.65218586			

R-Square	C.V.	Root MSE	ARMNLEN Mean
0.968391	22.21573	0.0828953	0.3731381

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DILUENT	1	0.14536773	0.14536773	21.15	0.0193
CONC	3	0.16237509	0.05412503	7.88	0.0620
CAN_AGT	1	0.07303276	0.07303276	10.63	0.0471
DILUENT*CONC	3	0.09257173	0.03085724	4.49	0.1245
CONC*CAN_AGT	3	0.15781490	0.05260497	7.66	0.0643
DILUENT*CAN_AGT	1	0.00040874	0.00040874	0.06	0.8230

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DILUENT	1	0.14536773	0.14536773	21.15	0.0193
CONC	3	0.16237509	0.05412503	7.88	0.0620
CAN_AGT	1	0.07303276	0.07303276	10.63	0.0471
DILUENT*CONC	3	0.09257173	0.03085724	4.49	0.1245
CONC*CAN_AGT	3	0.15781490	0.05260497	7.66	0.0643
DILUENT*CAN_AGT	1	0.00040874	0.00040874	0.06	0.8230

APPENDIX 57

SUMMARY OF THE SIX-MONTH INTERIM AND NINE-MONTH FINAL JAPANESE MEDAKA CHRONIC HISTOPATHOLOGY RESULTS

EPL®

EXPERIMENTAL PATHOLOGY LABORATORIES, INC.

U.S. ARMY BIOMEDICAL RESEARCH AND DEVELOPMENT LABORATORY
TEST 401-002R
EPL PROJECT NUMBER 406-035

WEST BRANCH CANAL CREEK CARCINOGENICITY STUDY WITH MEDAKA

SIX MONTH INTERIM SACRIFICE

PATHOLOGY SUMMARY

A histopathologic examination of tissues from fish of the species *Oryzias latipes* (Medaka) was performed to determine the need for remediation at West Branch Canal Creek, Aberdeen Proving Ground. Groundwater was pumped from a well on-site into two flow-through diluter systems in a biomonitoring trailer. One system had water from the West Branch of Canal Creek as the dilution water. The dilution water in the second system was dechlorinated tap water. Throughout the study laboratory control medaka were maintained at Fort Detrick in well water. At 13 days of age medaka were either initiated or not initiated with 10 mg/L diethylnitrosamine (DEN) for 48 hours. Exposure to the groundwater began at 16 days of age. At six months into the study approximately 20 medaka from each exposure group were euthanized for evaluation. The study design was as follows.

Group ID	Diluent Water	DEN (mg/L)	Groundwater (%)	No. of Fish at Study Start (Each Group)	No. of Fish Submitted at 6 months (Each Group)
1, 2	Canal Creek	0	0	80, 80	20, 20
3, 4	Canal Creek	10	0	80, 80	21, 20
5, 6	Canal Creek	0	1	80, 80	20, 20
7, 8	Canal Creek	10	1	80, 80	20, 20
9, 10	Canal Creek	0	5	80, 80	20, 21
11, 12	Canal Creek	10	5	80, 80	20, 20
13, 14	Canal Creek	0	25	80, 80	20, 20
15, 16	Canal Creek	10	25	80, 80	20, 20
17, 18	Dechlorinated Tap	0	0	80, 80	20, 20
19, 20	Dechlorinated Tap	10	0	80, 80	19, 20
21, 22	Dechlorinated Tap	0	1	80, 80	20, 20
23, 24	Dechlorinated Tap	10	1	80, 80	20, 20
25, 26	Dechlorinated Tap	0	5	80, 80	20, 20
27, 28	Dechlorinated Tap	10	5	80, 80	19, 20
29, 30	Dechlorinated Tap	0	25	80, 80	20, 19
31, 32	Dechlorinated Tap	10	25	80, 80	20, 20
33, 34	Lab Well	0	0	80, 80	20, 20
35, 36	Lab Well	10	0	80, 80	19, 20

Hematoxylin and eosin stained slides of each fish were prepared by Experimental Pathology Laboratories, Inc. The fish were sampled by cutting five step-sections through the whole fish in a longitudinal plane except when the location of a lesion necessitated an alternate method of sectioning. In fish with eye lesions the head was usually sectioned transversely while the body was sectioned longitudinally. The following tissues were evaluated: bone (vertebra), brain, chromaffin tissue, corpuscle of Stannius, esophagus, eye, gallbladder, gill, heart, hematopoietic tissue, interrenal tissue, intestine, kidney, liver, nares, ovary, pancreas, peripheral nerve, pineal organ, pituitary gland, pseudobranch, skeletal muscle, skin, spinal cord, spleen, stato-acoustic organ, swim bladder, testis, thymus, thyroid tissue, urinary bladder and gross lesions.

MEDAKA (GROUPS 1-16) HOUSED IN CANAL CREEK WATER AS DILUENT WATER

RESULTS

In medaka that were initiated with DEN, hepatocellular adenomas and hepatocellular carcinomas occurred among controls and groups exposed to various concentrations of groundwater in both males and females. In general the incidence was higher among the male medaka. Because the neoplasms occurred in all the exposure groups and the controls, it appears that the Canal Creek diluent water may have had a promotional effect in the liver, but why the incidence was higher in males among controls and medaka exposed to 25% groundwater as compared to medaka exposed to 1% and 5% groundwater is not known. Basophilic areas/foci and eosinophilic foci in the liver occurred in both males and females in control and groundwater exposure groups that were initiated with DEN. Following in Tables 1 and 2 are tabulations with the replicate groups combined of the incidences of liver neoplasms and foci in males (Table 1) and females (Table 2) initiated with DEN.

TABLE 1

Incidences of Liver Neoplasms and Foci in Male Medaka Initiated with DEN				
Group Numbers	3/4	7/8	11/12	15/16
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(20)	(19)	(21)	(25)
Hepatocellular Adenoma	4[1]	3[2]	2[3]	8
Hepatocellular Carcinoma	3	0	1	2
Basophilic Area/Foci	0	2	1	3
Eosinophilic Foci	6	1	7	7

[1]One fish had multiple adenomas.
[2]One fish died early.
[3]One fish also had a hepatocellular carcinoma.

TABLE 2

Incidences of Liver Neoplasms and Foci in Female Medaka Initiated with DEN				
Group Numbers	3/4	7/8	11/12	15/16
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(21)	(21)	(19)	(15)
Hepatocellular Adenoma	3	3	1	2
Hepatocellular Carcinoma	0	0	1	0
Basophilic Area/Foci	4	5	7[1]	3
Eosinophilic Foci	1	1	1	3

[1]One fish had both a basophilic area and basophilic foci.

Among the female medaka initiated with DEN there appears to be no promotional effect of the groundwater as the incidences of liver neoplasms and foci are similar among the various exposure groups. Among the male medaka initiated with DEN the incidence of neoplasia is highest in medaka exposed to 25% groundwater. However, there is also a high incidence among control males and a relatively low incidence in male medaka exposed to 1% and 5% groundwater which indicates that there is no promotional effect of the groundwater.

Following in Tables 3 and 4 are incidences of liver neoplasms and foci in male (Table 3) and female (Table 4) medaka that were not exposed to DEN.

TABLE 3

Incidences of Liver Neoplasms and Foci in Male Medaka Not Initiated with DEN

Group Numbers	1/2	5/6	9/10	13/14
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(23)	(19)	(22)	(23)
Hepatocellular Adenoma	0	2	0	0
Hepatocellular Carcinoma	0	0	0	0
Basophilic Foci	0	0	1	1
Eosinophilic Foci	0	0	1	0

Special stains were applied to selected slides for fish Nos. 3-14, 4-16, 12-22, 15-19 and 15-24. The results of these stains are discussed in the appropriate place in this report.

Tissues that were not present for examination in one or more medaka included bone (vertebra), chromaffin tissue, corpuscle of stannius, gallbladder, gonad, interrenal tissue, nares, pineal organ, pituitary, pseudobranch, spinal cord, spleen, swim bladder, thymus, and urinary bladder. Occasional absence of these tissues is a condition inherent in the sectioning method and did not affect the overall evaluation of the histopathology data. Only one medaka (Group 20 medaka Number 6) could not be identified as to sex because of no gonad in the section.

Microscopic findings for each tissue examined from each medaka are listed in the Histopathology Incidence Tables by sex. Inflammatory, degenerative and hyperplastic changes were graded from 1 to 5 depending upon severity. Nongradable changes, e.g., neoplasms, were designated as present (P). Tissues of insufficient quantity for evaluation are indicated with an "I." All lesions are summarized by sex and disposition on the Summary Incidence Tables. All lesions are summarized by sex and with sexes combined on the Incidence/Examined Summary with % Incidence tables. All neoplasms are presented on the Neoplasm Summary Incidence Tables by sex. A correlation of gross observations with the corresponding microscopic findings is presented in the Correlation of Gross and Microscopic Findings tables.

TABLE 4

Incidences of Liver Neoplasms and Foci in Female Medaka Not Initiated with DEN				
Group Numbers	1/2	5/6	9/10	13/14
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(17)	(21)	(19)	(17)
Hepatocellular Adenoma	0	0	1	0
Hepatocellular Carcinoma	1	0	0	0
Basophilic Foci	0	1	1	1
Eosinophilic Foci	0	0	1	0

The incidence of liver neoplasms and foci among groups of medaka that were not treated with DEN was less than in medaka initiated with DEN and the occurrence was sporadic among the groups. There appears to be no effect of either Canal Creek water or groundwater on the incidence of liver neoplasms or foci in either male or female medaka that were not initiated with DEN.

Hepatocellular vacuolation occurred to some degree in almost 100% of the medaka. Among male medaka the severity of the vacuolation varied from minimal (in one fish) to severe. Among female medaka the severity of the vacuolation varied from minimal to moderately severe. A vacuolated hepatocyte focus is a discrete area of hepatocytes that are vacuolated to a greater degree than the surrounding hepatocytes. This liver change occurred in 33 of 172 total male medaka and in 22 of 150 total female medaka. The change occurred more frequently among male and female medaka that had been exposed to DEN than among those medaka not

exposed to DEN. Cystic degeneration in the liver occurred among males and females in all groups and there appeared to be no marked differences in incidence or severity between male and female medaka and no differences between groups with respect to concentration of groundwater.

One Group 13 medaka No. 13 had an unusual area of cellular alteration in the liver which occupied approximately one third of the liver and was located ventrally. The area did not appear to distort the normal contour of the liver, nor did it appear to compress or invade the adjacent hepatic parenchyma. The cells of the area varied from being severely vacuolated to being larger than normal with a gray-blue granular cytoplasm. The lesion was diagnosed as "Area of Cellular Alteration" although a differential diagnosis of hepatocellular adenoma was considered.

A number of other liver changes were diagnosed, but the incidence, distribution and severity were such that they did not appear to be related to exposure. These changes are tabulated on the Summary Incidence Tables.

Hyaline material in the glomeruli of the kidney was an unusual change that occurred in the kidney of a number of medaka in all the exposure groups including the controls. There was no difference in incidence between males and females. There was a greater number of affected medaka among those that were initiated with DEN as compared to those that were not exposed to DEN (50 of 161 as compared to 27 of 161 respectively). The hyaline material occurred in and around glomerular capillary tufts and in a few medaka a similar material was located in

the cytoplasm of renal tubular epithelium. The hyaline deposit was usually minimal to mild but in several medaka the change was moderate to moderately severe. Interestingly the change was moderate to moderately severe in five medaka that also had a hepatocellular carcinoma in the liver. Hyaline droplet accumulation in rodent kidney proximal tubules has been associated with the occurrence of histiocytic sarcoma in rodents.[1] In medaka, however, the hyaline material is primarily in the glomeruli, and the association of the hyaline deposition with neoplasia is not a consistent finding. Although 22 of the medaka with liver neoplasia also had hyaline material in glomeruli to some degree, there were also medaka with glomerular hyaline material (usually minimal to mild in severity) that had no liver neoplasia and medaka with liver neoplasia that had no hyaline material in glomeruli.

Special stains were applied to slides on which the lesion of hyaline material in the glomeruli was present. The stains were Mallory's Heidenhain for protein, periodic acid-Schiff (PAS) for such tissue products as glycoproteins and fibrin, Ziehl-Neelson acid fast stain for lipofuscin and congo red and crystal violet stains for amyloid. The Ziehl-Neelson stained glomeruli were negative for lipofuscin. The hyaline deposits stained positively with Mallory's Heidenhain and PAS. The crystal violet stain was variably positive for amyloid. The hyaline material was stained by the congo red stain, but

[1]G.C. Hard and R.T. Snowden, Hyaline droplet accumulation in rodent kidney proximal tubules: an association with histiocytic sarcoma, Toxicologic Pathology, 1991, Vol. 19:2, pp. 88-97.

the stained areas did not exhibit green birefringence under polarized light to verify the presence of amyloid. The results indicate that the hyaline material is protein in nature, but precise identification was not made by this battery of stains. The pathogenesis of this hyaline deposit is not known.

Other changes which occurred commonly in the kidney among medaka of almost all groups included dilatation of Bowman's space, tubular dilatation and tubular casts. Neither the incidence nor severity of these changes occurred in a dose related fashion. Other kidney changes occurred sporadically among the groups and are tabulated in the Summary Incidence Tables. These changes usually occurred in only a few fish and there was no apparent relationship to exposure.

Increased basophilia of the follicular cells of the thyroid tissues occurred in 23 of 172 male medaka and in only five of 150 female medaka. Vacuolation of thyroid follicular cells was diagnosed in 22 of 172 male medaka and in only one of 150 female medaka. The reason for this increased basophilia and vacuolation of follicular cells especially in male medaka is not known.

Granulomas or focal granulomatous inflammation occurred sporadically in a variety of tissues in medaka in almost all groups. Metazoan parasites were present in a number of the granulomas that occurred in the intestine, mesentery, oviduct and pericardial cavity and in a number of the focal granulomatous inflammatory lesions of the skeletal muscle. This finding of parasites in the tissues of medaka exposed to natural surface water (Canal Creek) was not unexpected.

Lymphosarcoma, presumably of thymic origin, occurred in one Group 7 female medaka (7-24), one Group 8 male medaka (8-22) and one Group 13 male medaka (13-12). A hemangioma occurred in the ovary of control female medaka 1-17.

A variety of non-neoplastic lesions in a number of different tissues occurred sporadically among medaka and are tabulated in the Summary Incidence Tables. These lesions either occurred in only a few fish or, if they occurred in both control and exposed groups, neither the incidence nor the severity suggested a relationship to exposure to groundwater.

CONCLUSIONS

It appears that the water of Canal Creek that was used as a diluent water in the study had a promotional effect on the liver for neoplasia and foci of cellular alteration in male and female medaka that were initiated with DEN. There appears to be no promotional effect of the groundwater on the liver for neoplasia or foci of cellular alteration in male or female medaka that were initiated with DEN. There appears to be no effect of either Canal Creek or groundwater on the incidence of liver neoplasia or foci of cellular alteration in either male or female medaka that were not initiated with DEN.

Hyaline material in the glomeruli of the kidney is an interesting change that occurred in a number of medaka in all groups including the controls, although the incidence overall was greater among

the medaka that were initiated with DEN as compared to those that were not initiated with DEN. The pathogenesis of this kidney change is not known. Special stains indicate that the hyaline material is protein in nature.

Metazoan parasites were associated with granulomas or focal granulomatous inflammation in the intestine, mesentery, oviduct, pericardial cavity and skeletal muscle. This finding was not unexpected in medaka exposed to a natural surface water.

MEDAKA (GROUPS 17-32) HOUSED IN DECHLORINATED TAP WATER AS DILUENT WATER

RESULTS

In medaka that were initiated with DEN, hepatocellular adenomas occurred among both males and females and hepatocellular carcinomas occurred only in male medaka. The incidence of hepatocellular adenomas was higher in the males than in the females. Basophilic areas/foci and/or eosinophilic foci in the liver occurred in both males and females in control and all but one (Group 24) of the groundwater exposure groups that were initiated with DEN. Following in Tables 5 and 6 are tabulations with the replicate groups combined of the incidences of liver neoplasms and foci in males (Table 5) and females (Table 6) initiated with DEN.

TABLE 5

Incidences of Liver Neoplasms and Foci in Male Medaka Initiated with DEN				
Group Numbers	19/20	23/24	27/28	31/32
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(21)	(24)	(20)	(19)
Hepatocellular Adenoma	0	1	1[1]	3
Hepatocellular Carcinoma	0	1	1	0
Basophilic Area/Foci	4	0	1	1
Eosinophilic Foci	2	4	3	5

[1]This fish had multiple adenomas

TABLE 6

Incidences of Liver Neoplasms and Foci in Female Medaka Initiated with DEN				
Group Numbers	19/20	23/24	27/28	31/32
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(17)	(16)	(19)	(21)
Hepatocellular Adenoma	1	0	0	1
Hepatocellular Carcinoma	0	0	0	0
Basophilic Area/Foci	8	0	2	2
Eosinophilic Foci	0	1	1	3

Among the female medaka initiated with DEN there appears to be no promotional effect of the groundwater as there is no dose relationship between treatment and the incidences of neoplasms or foci. Among the male medaka initiated with DEN liver neoplasms occurred only

in medaka exposed to groundwater but the incidence is low at each of the groundwater concentrations. There is no dose relationship in incidence of liver neoplasms or foci.

Following in Tables 7 and 8 are incidences of liver neoplasms and foci in male (Table 7) and female (Table 8) medaka that were not exposed to DEN.

TABLE 7

Incidences of Liver Neoplasms and Foci in Male Medaka Not Initiated with DEN

Group Numbers	17/18	21/22	25/26	29/30
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(19)	(18)	(19)	(19)
Hepatocellular Adenoma	1	1	1	1
Hepatocellular Carcinoma	0	0	0	0
Basophilic Foci	0	0	0	1
Eosinophilic Foci	0	0	0	1

TABLE 8

Incidences of Liver Neoplasms and Foci in Female Medaka Not Initiated with DEN

Group Numbers	17/18	21/22	25/26	29/30
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(21)	(22)	(21)	(20)
Hepatocellular Adenoma	0	0	0	1
Hepatocellular Carcinoma	0	0	0	0
Basophilic Foci	0	0	0	0
Eosinophilic Foci	0	0	0	0

The incidence of liver neoplasms and foci among groups of medaka that were not treated with DEN was less than in medaka initiated with DEN. Only one female exposed to 25% groundwater had a hepatocellular adenoma. One male medaka among the controls and at each of the groundwater concentrations had a hepatocellular adenoma. There appears to be no effect of groundwater on the incidence of liver neoplasms or foci in either male or female medaka that were not initiated with DEN.

Hepatocellular vacuolation occurred to some degree in about 89% of the medaka. Among both males and females the severity of the vacuolation varied from minimal to moderately severe with less than ten medaka having moderately severe vacuolation. Vacuolated hepatocyte foci occurred in 49 of 159 total male medaka and 32 of 157 total female medaka. The change occurred more frequently among male and female medaka that had been exposed to DEN than among those medaka not exposed to DEN. Cystic degeneration in the liver occurred among males and females in all groups and there appeared to be no marked differences in incidence or severity between male and female medaka and no differences between groups with respect to concentration of groundwater. The incidence of hepatic cysts in the liver is greater among female medaka (39 of 157) than among male medaka (16 of 159). The incidence, however, is not related in either sex to groundwater concentration or DEN initiation.

A number of other liver changes were diagnosed, but the incidence, distribution and severity were such that they did not appear

to be related to exposure. These changes are tabulated on the Summary Incidence Tables.

Hyaline material in the glomeruli of the kidney occurred only in four of 157 female medaka and three of 159 male medaka and was usually minimal in severity. In one male medaka (No. 32-22) initiated with DEN and exposed to 25% groundwater there was a hepatocellular adenoma as well as hyaline material in glomeruli.

Other changes which occurred commonly in the kidney throughout most groups were dilatation of Bowman's space, tubular dilatation and tubular casts. These changes occurred more frequently among the males than the females, but neither the incidence nor the severity of these changes occurred in a dose related or exposure related manner. Other kidney changes occurred sporadically among the groups and are tabulated in the Summary Incidence Tables. These changes usually occurred in only a few fish and there was no apparent relationship to exposure to groundwater.

Increased basophilia of the follicular cells of the thyroid tissue occurred in 51 of 159 male medaka and only three of 157 female medaka. The incidence did not appear to be related to exposure to groundwater. Vacuolation of thyroid follicular cells was diagnosed in 38 of 159 male medaka and in no female medaka. The reason for increased basophilia and vacuolation of follicular cells in male medaka is not known.

In the gills there was fusion of gill lamellae and hyperplasia of gill epithelium among males and females in all groups. The severity

was minimal to mild and there was no apparent relationship to the exposure concentration of groundwater. The incidence of these lesions was highest in medaka from groups 23 and 24 initiated with DEN and exposed to 1% groundwater, but the reason for the higher incidence in these groups over other groups is not known.

Granulomas occurred sporadically in a variety of tissues in both control fish and fish exposed to groundwater. No metazoan parasites were associated with granulomas.

A seminoma was diagnosed in the ovary of one Group 28 medaka (28-3).

A variety of non-neoplastic lesions in a number of different tissues occurred sporadically among medaka and are tabulated in the Summary Incidence Tables. These lesions either occurred in only a few fish or, if they occurred in both control and exposed groups, neither the incidence nor the severity suggested a relationship to exposure to groundwater.

CONCLUSIONS

Hepatocellular adenomas and carcinomas occurred in male medaka initiated with DEN and exposed to 1%, 5% and 25% groundwater, but not in controls. The number of affected fish was low and there was no relationship to concentration of groundwater. Only two female medaka initiated with DEN, one control and one exposed to 25% groundwater, had hepatocellular adenomas. Foci of cellular alteration occurred in both control and exposed groups among males and females initiated with DEN,

but there was no relationship of incidence to concentration of groundwater.

The incidence of liver neoplasia and foci of cellular alteration was less in medaka that were not initiated with DEN than in medaka that were initiated with DEN. There appeared to be no effect of groundwater on the incidence in either males or females.

Hyaline material in the glomeruli of the kidney occurred in only a few medaka (seven) in dechlorinated tap water as a diluent water and in only one of these fish (male medaka 32-22) was there also a liver neoplasm diagnosed.

MEDAKA (GROUPS 33-36) HOUSED IN LABORATORY WELL WATER AT FORT DETRICK, MD

RESULTS

There were no neoplasms diagnosed among the medaka that were housed in well water as laboratory controls. One Group 36 male medaka (36-3) had an eosinophilic focus in the liver.

Hepatocellular vacuolation of minimal to moderate severity occurred in 54% of medaka in all four laboratory control groups and DEN initiation did not appear to have an effect on incidence or severity. Cystic degeneration of the liver of minimal severity was present in small numbers of fish from all four groups. A vacuolated hepatocyte focus of minimal severity was diagnosed in one Group 34 medaka. Five medaka from Groups 35 and 36 that were initiated with DEN had vacuolated hepatocyte foci that were minimal to mild in severity.

Hyaline material in the glomeruli of the kidney did not occur among the laboratory controls. Dilatation of Bowman's space, tubular dilatation and tubular casts occurred sporadically among medaka of Groups 34, 35 and 36.

In the gills, hyperplasia of gill epithelium and fusion of gill lamellae, usually of minimal severity, were present in a number of male and female medaka from each of the four groups.

There were no metazoan parasites associated with granulomas that occurred in a few fish in the liver, mesentery, hematopoietic tissue and retroperitoneal adipose tissue.

Increased basophilia of the follicular cells of the thyroid tissue was diagnosed in one of 10 male medaka from Group 33 and in two of 13 male medaka from Group 36.

A variety of non-neoplastic lesions in a number of different tissues occurred sporadically among medaka and are tabulated in the Summary Incidence Tables.

CONCLUSIONS

No liver neoplasms occurred in medaka that were held in laboratory well water for six months. One medaka in Group 36 that was initiated with DEN had an eosinophilic focus in the liver. Other findings in these laboratory control medaka would not be unexpected in medaka held in well water for six months.

SUMMARY COMPARISON OF FINDINGS IN MEDAKA HELD IN CANAL CREEK WATER, DECHLORINATED TAP WATER AND LABORATORY WELL WATER

The incidence of neoplasia and foci of cellular alteration was highest among the medaka that were initiated with DEN and housed in Canal Creek water as diluent water and there appeared to be a promotional effect of the Canal Creek water, but not the groundwater, in both male and female medaka. (See Tables 1 and 2.)

Among male medaka that were housed in dechlorinated tap water as diluent water, liver neoplasia occurred at a low incidence in groups that were initiated with DEN and exposed to various concentrations of groundwater. (See Table 5.) Foci of cellular alteration occurred in control and groundwater exposed fish, but the incidence was not dose related. Among female medaka initiated with DEN only the incidence of foci of cellular alteration was increased over that which occurred in females not initiated with DEN. (See Tables 6 and 8.) Among male medaka not initiated with DEN a hepatocellular adenoma occurred in one medaka in the control group and in each of the three groundwater concentrations. (See Table 7.) Assessment of the significance of liver neoplasia in medaka exposed to groundwater in dechlorinated tap water as a diluent water will be more meaningful after medaka that have been exposed under these same conditions for nine months are evaluated.

No liver neoplasms occurred among medaka that were housed in laboratory well water.

Vacuolation of hepatocytes in the liver had an incidence of almost 100% in medaka housed in Canal Creek water, 89% in medaka housed

in dechlorinated tap water and in 54% of medaka housed in laboratory well water. Overall the average severity of the vacuolation was greatest in the medaka housed in Canal Creek water. Incidence and severity of hepatocellular vacuolation in the liver of medaka exposed to Canal Creek water may have been, at least in part, the result of the additional food supply that was present in the natural surface water.

Hyaline material in the glomeruli of the kidney occurred in the highest incidence in medaka that were housed in Canal Creek water. This material was identified as protein in nature by a battery of special stains. The pathogenesis of this glomerular deposit is not known, but hyaline material, moderate to moderately severe, was present in the kidney of five medaka that also had a hepatocellular carcinoma in the liver. Hyaline material, usually of minimal to mild severity, occurred in medaka that had no liver neoplasia and there were medaka with liver neoplasia that had no hyaline material in the glomeruli. By comparison only a few medaka housed in dechlorinated tap water had hyaline material in the glomeruli of the kidney and this change was not diagnosed in any medaka housed in laboratory well water. There appears to be an association of this protein deposit with Canal Creek water as a diluent water and possibly with the initiation of the medaka with DEN.

Granulomas in the intestine, mesentery, oviduct and pericardial cavity and focal granulomatous inflammation in the skeletal muscle were associated with metazoan parasites only in medaka housed in Canal Creek water. These parasites were present apparently in the natural surface water.

Lymphosarcoma occurred in three medaka housed in Canal Creek water and did not occur among medaka in dechlorinated tap water or laboratory well water. The number of cases of lymphosarcoma is too small to be significant, but additional information from the evaluation of medaka on test for nine months may be helpful in the interpretation of these cases of lymphosarcoma.

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Pathologist

November 13, 1995

MJW/adu

EPL®

EXPERIMENTAL PATHOLOGY LABORATORIES, INC.

QUALITY ASSURANCE FINAL CERTIFICATION

Study Title: West Branch Canal Creek Carcinogenicity Study with Medaka
Six Month Interim Sacrifice

Client Study: Test 401-002R EPL Project Coordinator: Dr. Marilyn J. Wolfe

EPL Project Number: 406-035 EPL Pathologist: Dr. Marilyn J. Wolfe

The following aspects of this study were inspected by the Quality Assurance Unit of Experimental Pathology Laboratories, Inc. Dates inspections were performed and findings reported to the Project Coordinator and Management are indicated below.

Area Inspected	Dates: Inspection	Dates: Reporting
EPL Project Sheet	3/28/95; 6/6/95; 8/25/95; 9/13/95	3/28/95; 6/6/95; 8/25/95; 9/13/95
Project Setup	4/13/95	4/13/95
Histology Setup	4/21/95; 5/1,10,17/95	4/21/95; 5/1,10,17/95
Data Review	5/2,10,11,15,24,25,30/95; 6/2,5,6,8,9,15,19,21,22/95; 6/27,30/95; 7/6,7,11/95	5/2,10,11,15,24,25,30/95; 6/2,5,6,9,15,19,21,22/95; 6/27,30/95; 7/6,7,11/95
Rough Draft Report	8/25,28-31/95; 9/2,13/95; 9/14,19/95	9/14,20/95
Final Report	11/13/95	11/13/95

Date of last quarterly facility inspection 10/95

Patricia L. Runge
EPL Quality Assurance Unit

11/13/95
Date

Form No. 45 (Revised 1/95)

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EXPERIMENTAL PATHOLOGY LABORATORIES, INC.

FINAL DRAFT

U.S. ARMY
BIOMEDICAL RESEARCH AND DEVELOPMENT LABORATORY
TEST 401-002R
EPL PROJECT NUMBER 406-035

WEST BRANCH CANAL CREEK CARCINOGENICITY STUDY WITH MEDAKA

NINE MONTH FINAL SACRIFICE OF MEDAKA EXPOSED TO WEST BRANCH CANAL CREEK WATER AS THE DILUENT WATER

PATHOLOGY SUMMARY

A histopathologic examination of tissues from fish of the species *Oryzias latipes* (medaka) was performed to determine the need for remediation at West Branch Canal Creek, Aberdeen Proving Ground. Groundwater was pumped from a well on-site into two flow-through diluter systems in a biomonitoring trailer. One system had water from the West Branch of Canal Creek as the dilution water. The dilution water in the second system was dechlorinated tap water. Throughout the study control medaka were maintained at Fort Detrick in laboratory well water. At 13 days of age medaka were either initiated or not initiated with 10 mg/L diethylnitrosamine (DEN) for 48 hours. Exposure to the groundwater began at 16 days of age.

At six months into the study approximately 20 medaka from each exposure group were euthanized for evaluation and the results were presented in a separate report. The remainder of the medaka maintained in dechlorinated tap water as the diluent water, and the remainder of the medaka maintained in laboratory well water were euthanized for evaluation at nine months and the results were presented in a separate report. The medaka maintained in Canal Creek water as diluent water

were transferred to dechlorinated tap water at six months because there was insufficient water from the creek to maintain the fish. These fish remained in dechlorinated tap water as the diluent water for the remaining three months of the study. At nine months into the study these medaka were euthanized for evaluation and are the subject of this report. The study design was as follows.

Group ID	Diluent Water	DEN (mg/L)	Groundwater (%)	No. of Fish at Study Start (Each Group)	No. of Fish Submitted at 9 months (Each Group)
1, 2	Canal Creek	0	0	80, 80	18, 31
3, 4	Canal Creek	10	0	80, 80	27, 22
5, 6	Canal Creek	0	1	80, 80	25, 26
7, 8	Canal Creek	10	1	80, 80	20, 19
9, 10	Canal Creek	0	5	80, 80	24, 30
11, 12	Canal Creek	10	5	80, 80	16, 27
13, 14	Canal Creek	0	25	80, 80	27, 21
15, 16	Canal Creek	10	25	80, 80	24, 19

Hematoxylin and eosin stained slides of each fish were prepared by Experimental Pathology Laboratories, Inc. The fish were sampled by cutting five step sections through the whole fish in a longitudinal plane except when the location of a lesion necessitated an alternate method of sectioning. A duplicate set of slides was made for each medaka. This set remained unstained unless staining was required for diagnostic purposes. The following tissues were evaluated: bone (vertebra), brain, chromaffin tissue, corpuscle of Stannius, esophagus, eye, gallbladder, gill, heart, hematopoietic tissue, interrenal tissue, intestine, kidney, liver, nares, ovary, pancreas, peripheral nerve, pineal organ, pituitary, pseudobranch, skeletal muscle, skin, spinal

cord, spleen, stato-acoustic organ, swim bladder, testis, thymus, thyroid tissue, urinary bladder and gross lesions.

Tissues that were not present for examination in one or more medaka included bone (vertebra), chromaffin tissue, corpuscle of Stannius, eye, gallbladder, gonad, interrenal tissue, nares, pineal organ, pituitary, spinal cord, spleen, thymus and urinary bladder. Occasional absence of these tissues is a condition inherent in the sectioning method and did not appear to affect the overall evaluation of the histopathology data. Two fish (Group 6 medaka No. 6-37 and Group 7 medaka No. 7-47) could not be identified as to sex because of no gonad in the sections.

Microscopic findings for each tissue examined from each medaka are listed in the Histopathology Incidence Tables by sex. Inflammatory, degenerative and hyperplastic changes were graded from 1 to 5 depending upon severity. Nongradable changes, e.g., neoplasms, were designated as present (P). Tissues of insufficient quantity for evaluation are indicated with an "I." Autolyzed tissues are indicated with an "A." Medaka that died early appear on the Histopathology Incidence Tables with a "U" designation by the individual animal number. All lesions are summarized by sex and disposition on the Summary Incidence Tables. All lesions are summarized by sex and with sexes combined on the Incidence/ Examined Summary with % Incidence Tables. All neoplasms are presented on the Neoplasm Summary Incidence Tables by sex. A correlation of gross observations with the corresponding microscopic findings is presented in the Correlation of Gross and Microscopic Findings Tables.

RESULTS

In medaka that were initiated with DEN, hepatocellular adenomas and hepatocellular carcinomas occurred among both males and females. The incidence of these neoplasms was highest among males in Groups 15 and 16 which were exposed to 25% groundwater and was higher among male medaka (14 of 22) than among female medaka (5 of 21) in these groups. In control groups 3 and 4, the incidence of liver hepatocellular neoplasia was higher among the females (8 of 32) than among the males (1 of 17). A cholangiocarcinoma occurred in one Group 4 male medaka. This neoplasm was unusual in that the neoplastic bile duct epithelium did not form a discrete mass but was dispersed among clusters of what appeared to be hyperplastic hepatocytes. Following in Tables 1 and 2 are tabulations with the replicate groups combined of the incidences of liver neoplasms and areas/foci in males (Table 1) and females (Table 2) initiated with DEN. One Group 7 medaka No. 7-47 had a hepatocellular carcinoma but had no gonad in the sections and is not represented in the tables.

TABLE 1

Incidences of Liver Neoplasms and Areas/Foci in Male Medaka Initiated with DEN				
Group Numbers	3/4	7/8	11/12	15/16
Groundwater Concentration	0%	1%	5%	25%
Total Number Medaka	(17)	(25)	(17)	(22)
Cholangiocarcinoma	1	0	0	0
Hepatocellular Adenoma	1	4[1]	4	7[1]
Hepatocellular Adenoma, Multiple	0	1	0	4[1]
Hepatocellular Carcinoma	0	5[1]	2	3
Basophilic Areas/Foci	5	4	3	6
Eosinophilic Foci	2	4	4	7
Foci of Cellular Alteration	0	0	2	1

[1]One of these fish died early.

TABLE 2

Incidences of Liver Neoplasms and Areas/Foci in Female Medaka Initiated with DEN				
Group Numbers	3/4	7/8	11/12	15/16
Groundwater Concentration	0%	1%	5%	25%
Total Number Medaka	(32)	(13)	(26)	(21)
Cholangiocarcinoma	0	0	0	0
Hepatocellular Adenoma	4	4	3	4
Hepatocellular Adenoma, Multiple	0	0	0	0
Hepatocellular Carcinoma	4	0	2	1
Basophilic Areas/Foci	12	5	9	7
Eosinophilic Foci	1	2	0	1
Foci of Cellular Alteration	3	0	0	0

Among the male medaka initiated with DEN, hepatocellular neoplasms occurred in 10 of 25 fish (40%) exposed to 1% groundwater, six of 17 fish (35%) exposed to 5% groundwater and 14 of 22 fish (64%) exposed to 25% groundwater. Among control males one of 17 fish had a

hepatocellular neoplasm. This apparently low incidence of hepatocellular neoplasms in controls is difficult to explain in light of the incidence in DEN-initiated control males from the six month interim sacrifice (7 of 20 fish) and the incidence in DEN-initiated control males in dechlorinated tap water from the nine month final sacrifice (8 of 40 fish). Based on this control incidence data, the one hepatocellular neoplasm in 17 fish may be spurious data, and there may be a slight promotional effect of groundwater on hepatocellular neoplasia only at the 25% concentration. In a number of male medaka some variety of focus (usually only one type) occurred in the same fish that had a hepatocellular neoplasm.

Among the female medaka initiated with DEN, the incidence in the groups exposed to 1% groundwater (four of 13 or 31%) and in controls (eight of 32 or 25%) was greater than the incidence in groups exposed to 5% groundwater (five of 26 or 19%) or 25% groundwater (five of 21 or 24%). This distribution of neoplasms indicates that the promotional effect of Canal Creek water which was evident at six months (see the pathology summary for the six month interim sacrifice of medaka from the West Branch Canal Creek Carcinogenicity Study with Medaka) may still be evident at nine months even though the fish were not exposed to Canal Creek water for the last three months of the study. One or two female medaka among controls and in groups exposed to 1, 5 or 25% groundwater have both a hepatocellular neoplasm and some variety of focus in the same fish.

Following in Tables 3 and 4 are incidences of liver neoplasms and foci in male (Table 3) and female (Table 4) medaka that were not exposed to DEN. Two male medaka one each in Groups 13 and 14 have both a hepatocellular neoplasm and some variety of focus.

TABLE 3

Incidences of Liver Neoplasms and Areas/Foci in Male Medaka
Not initiated with DEN

Group Numbers	1/2	5/6	9/10	13/14
Groundwater Concentration	0%	1%	5%	25%
Total Number Medaka	(22)	(23)	(22)	(25)
Cholangiocarcinoma	0	0	0	0
Hepatocellular Adenoma	1	1	0	2
Hepatocellular Adenoma, Multiple	0	0	0	1
Hepatocellular Carcinoma	0	0	1	0
Basophilic Areas/Foci	3	1	0	3
Eosinophilic Foci	0	0	0	1
Foci of Cellular Alteration	0	0	0	0

TABLE 4

Incidences of Liver Neoplasms and Areas/Foci in Female Medaka
Not initiated with DEN

Group Numbers	1/2	5/6	9/10	13/14
Groundwater Concentration	0%	1%	5%	25%
Total Number Medaka	(27)	(27)	(32)	(23)
Cholangiocarcinoma	0	0	0	0
Hepatocellular Adenoma	0	1	1	0
Hepatocellular Adenoma, Multiple	0	0	0	0
Hepatocellular Carcinoma	0	1	0	1
Basophilic Areas/Foci	2	2	1	0
Eosinophilic Foci	1	0	0	0
Foci of Cellular Alteration	0	0	1	0

The incidence of liver neoplasms and foci among male and female medaka that were not initiated with DEN was less than in medaka initiated with DEN. The incidence of liver neoplasia was greatest in male medaka exposed to 25% groundwater although hepatocellular adenomas occurred in only three of 25 males in this exposure group. There appeared to be only a slight effect of 25% groundwater on the incidence of liver neoplasia in the males. Among female medaka there was no apparent effect of exposure. Although there were no liver neoplasms among controls, there were only one or two neoplasms in each of the three exposure groups.

Hepatocellular vacuolation in the liver occurred to some degree in about 91% of the medaka and varied from minimal to severe among all the medaka. A greater number of males than females (102 compared to 76) had moderate to severe vacuolation. Vacuolated hepatocyte foci, discrete areas of hepatocytes that are vacuolated to a greater degree than the surrounding hepatocytes, occurred more frequently among female medaka (88 of 201) than among male medaka (47 of 173). Cystic degeneration in the liver occurred among males and females in all groups and varied in severity from minimal to moderately severe. A slightly greater number of females than males exhibited this change, and there were no relationships of incidence to groundwater concentration or DEN initiation. The incidence of hepatic cysts in the liver was greater among female medaka than among male medaka. The incidence, however, was not related in either sex to groundwater concentration or DEN initiation.

A number of other liver changes were diagnosed, but the incidence, distribution and severity were such that they did not appear to be related to exposure. These changes are tabulated on the Summary Incidence Tables.

Hyaline material in the glomeruli of the kidney occurred in seven female medaka, ten male medaka and in two medaka that could not be sexed. Eight of the males with hyaline material in the glomeruli also had a hepatocellular neoplasm (seven had a carcinoma and one had multiple adenomas). All eight males were in exposure groups that had been initiated with DEN. Two female medaka with hyaline material in glomeruli had hepatocellular neoplasia (one had a carcinoma and one had an adenoma) and both were in exposure groups that had been initiated with DEN. One of the medaka that was not sexed had a hepatocellular carcinoma and had been initiated with DEN. The association of hyaline material in glomeruli with liver neoplasms is not a consistent finding. For a further discussion of this relationship see the pathology summary for the six month interim sacrifice of medaka from the West Branch Canal Creek Carcinogenicity Study with Medaka.

Other changes that occurred commonly in the kidney throughout all groups were tubular dilatation and tubular casts. These changes were much more frequent among males than among the females but neither the incidence nor the severity of these changes occurred in a dose related or exposure related manner. Tubular degeneration, tubular mineralization, dilatation of Bowman's space and granulomatous inflammation of tubules, when they occurred, often were in medaka that

also had tubular dilatation and/or tubular casts. Other kidney changes occurred sporadically among the groups and are tabulated in the Summary Incidence Tables. These changes usually occurred in small numbers of medaka and there was no apparent relationship to exposure.

Increased basophilia of the follicular cells of the thyroid tissue occurred in almost all of the male medaka (minimal to moderate severity) and in about 19% of the female medaka (usually minimal severity). The incidences among the groups did not appear to be related to exposure to groundwater or DEN. Other thyroid tissue changes such as hyperplasia, vacuolation of follicular cells and hypertrophy of follicular cells were also more frequent among males than females. One Group 15 male and one Group 1 female had a follicular cell adenoma of the thyroid.

In the gills there were fusion of gill lamellae and hyperplasia of gill epithelium among males and females in all groups, but the incidence was slightly higher among male medaka. The severity was minimal to moderate, but there was no relationship of incidence or severity to exposure to groundwater or DEN. Other gill lesions occurred sporadically or the distribution was such that there was no relationship to exposure.

Metazoan parasites were present sporadically in the gill, intestine, kidney, liver, mesentery, ovary, pancreas, pericardial cavity, skeletal muscle, testis and on the skin. The parasites were minimal in number and were often, but not always, associated with a granuloma. This finding of parasites in the tissues of medaka that had

been exposed to natural surface water (Canal Creek) was not unexpected. Other granulomas, not associated with parasites, occurred sporadically in a variety of tissues and were not related to sex or exposure.

A variety of neoplasms in different tissues occurred sporadically throughout the groups among males and females. The incidence of these neoplasms in each group was small (one or two) and could not be attributed to exposure to groundwater. These neoplasms are tabulated in Table 5. Lymphosarcoma is a neoplasm that often affects more than one tissue in a single fish. This neoplasm is tabulated only in its probable tissue of origin in Table 5. Other affected tissues in a particular fish are recorded on the Histopathology Incidence Tables.

TABLE 5

Incidences of Various Neoplasms Other Than Liver Neoplasms

Group Numbers	1/2	3/4	5/6	7/8	9/10	11/12	13/14	15/16
Groundwater Concentration	0%	0%	1%	1%	5%	5%	25%	25%
DEN (mg/L)	0	10	0	10	0	10	0	10
Adipose Tissue, Retroperitoneal Myxosarcoma	-	-	-	-	-	-	-	1[1]
Branchial Chamber Lymphosarcoma	-	-	-	-	-	1[1,2]	-	-
Ovary Seminoma	-	-	-	-	-	-	-	1[3]
Swim Bladder Carcinoma in Situ	-	-	-	1[3]	-	-	-	-
Thymus Lymphosarcoma	2[1,3]	1[1]	-	-	-	1[1]	-	-
Thyroid Tissue Follicular Cell Adenoma	1[3]	-	-	-	-	-	-	1[1]

[1]Male Medaka
[2]This lymphosarcoma may have originated in the thymus, but that origin was not obvious in the tissue evaluated.
[3]Female Medaka

The carcinoma in situ diagnosed in the swim bladder of medaka No. 7-55 was problematic to interpret, and a differential diagnosis considered was focal dysplasia/hyperplasia. The lesion was located in the middle to caudal aspect of the swim bladder and the epithelium involved in the lesion was not the secretory epithelium of the cranial aspect of the swim bladder. The myxosarcoma that occurred in the

retroperitoneal adipose tissue of medaka No. 15-37 (a fish that died early) had invaded the adjacent skeletal muscle.

A common gross observation made at necropsy among these medaka was a large, or inflamed or swollen anal passage or opening. At gross trimming these observations were related to a bulge of tissue in the area of the anus identified as the urinogenital papillae, an anatomic sex characteristic of female medaka. In the histologic section the urinogenital papillae of a number of fish was notably larger than in others and diagnoses of hypertrophy and/or hyperplasia of the covering epithelium were made. There was a wide variation in the amount of tissue from the urinogenital papillae present in the histologic sections. Enlarged urinogenital papillae observed grossly may not have been captured ideally in the step sections; therefore a number of gross observations do not have a microscopic correlation. It is known that the size of the papillae may vary with the breeding season of medaka, and, experimentally, the size may be altered by exposure to female or male hormones.[1] The reason for the noticeable enlargement of the urinogenital papillae in these medaka is not known. There is no relationship of incidence of enlargement observed grossly and exposure to groundwater or DEN.

A variety of non-neoplastic lesions in a number of different tissues occurred sporadically among medaka and are tabulated in the

[1]Toki-O Yamamoto and Hajime Suzuki, The manifestation of the urinogenital papillae of the medaka (*Oryzias latipes*) by sex-hormones, Embryologia, 2:11, 1955.

Summary Incidence Tables. These lesions either occurred in only a few fish or, if they occurred in both control and exposed groups, neither the incidence nor the severity suggested a relationship to exposure to groundwater and/or DEN.

CONCLUSIONS

Among the male medaka initiated with DEN there appeared to be a promotional effect of the groundwater on the development of hepatocellular neoplasms although there is no strict dose relationship in incidence. Among female medaka initiated with DEN the percent incidence was greater in controls and medaka exposed to 1% groundwater than in medaka exposed to 5% and 25% groundwater. Among medaka that were not initiated with DEN there appeared to be only a slight effect of 25% groundwater on the incidence of liver neoplasia in males. There was no apparent effect of groundwater exposure on females that were not initiated with DEN.

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APR 22 1996

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WEST BRANCH CANAL CREEK CARCINOGENICITY STUDY WITH MEDAKA

NINE MONTH FINAL SACRIFICE OF MEDAKA EXPOSED
TO DECHLORINATED TAP WATER AS THE DILUENT WATER
AND THE LABORATORY WELL WATER CONTROL MEDAKA

PATHOLOGY SUMMARY

A histopathologic examination of tissues from fish of the species *Oryzias latipes* (medaka) was performed to determine the need for remediation at West Branch Canal Creek, Aberdeen Proving Ground. Groundwater was pumped from a well on-site into two flow-through diluter systems in a biomonitoring trailer. One system had water from the West Branch of Canal Creek as the dilution water. The dilution water in the second system was dechlorinated tap water. Throughout the study control medaka were maintained at Fort Detrick in laboratory well water. At 13 days of age medaka were either initiated or not initiated with 10 mg/L diethylnitrosamine (DEN) for 48 hours. Exposure to the groundwater began at 16 days of age. At six months into the study approximately 20 medaka from each exposure group were euthanized for evaluation and the results were presented in a separate report. Medaka maintained in dechlorinated tap water as the diluent water and medaka maintained in

laboratory well water continued on test for an additional three months. At nine months into the study these medaka were euthanized for evaluation and are the subject of this report. The study design was as follows.

Group ID	Diluent Water	DEN (mg/L)	Groundwater (%)	No. of Fish at Study Start (Each Group)	No. of Fish Submitted at 9 months (Each Group)
17, 18	Dechlorinated Tap	0	0	80, 80	33, 42
19, 20	Dechlorinated Tap	10	0	80, 80	33, 37
21, 22	Dechlorinated Tap	0	1	80, 80	28, 31
23, 24	Dechlorinated Tap	10	1	80, 80	33, 34
25, 26	Dechlorinated Tap	0	5	80, 80	34, 35
27, 28	Dechlorinated Tap	10	5	80, 80	35, 32
29, 30	Dechlorinated Tap	0	25	80, 80	29, 31
31, 32	Dechlorinated Tap	10	25	80, 80	30, 37
33, 34	Lab Well	0	0	80, 80	37, 39
35, 36	Lab Well	10	0	80, 80	36, 38

Hematoxylin and eosin stained slides of each fish were prepared by Experimental Pathology Laboratories, Inc. The fish were sampled by cutting five step sections through the whole fish in a longitudinal plane except when the location of a lesion necessitated an alternate method of sectioning. A duplicate set of slides was made for each medaka. This set remained unstained unless staining was required for diagnostic purposes. The following tissues were evaluated: bone (vertebra), brain, chromaffin tissue, corpuscle of Stannius, esophagus, eye, gallbladder, gill, heart, hematopoietic tissue, interrenal tissue, intestine, kidney, liver, nares, ovary, pancreas, peripheral nerve, pineal organ, pituitary gland, pseudobranch, skeletal muscle, skin,

spinal cord, spleen, stato-acoustic organ, swim bladder, testis, thymus, thyroid tissue, urinary bladder and gross lesions.

Tissues that were not present for examination in one or more medaka included bone (vertebra), chromaffin tissue, corpuscle of Stannius, gallbladder, interrenal tissue, nares, pineal organ, pituitary, spinal cord, spleen, thymus and urinary bladder. Occasional absence of these tissues is a condition inherent in the sectioning method and did not appear to affect the overall evaluation of the histopathology data.

The unstained slides for Group 20 medaka No. 57 were stained with hematoxylin and eosin for evaluation of what appeared to be liver tissue herniated into the pericardial cavity.

Microscopic findings for each tissue examined from each medaka are listed in the Histopathology Incidence Tables by sex. Inflammatory, degenerative and hyperplastic changes were graded from 1 to 5 depending upon severity. Nongradable changes, e.g., neoplasms, were designated as present (P). Tissues of insufficient quantity for evaluation are indicated with an "I." Autolyzed tissues are indicated with an "A." Medaka that died early appear on the Histopathology Incidence Tables with a "U" designation by the individual animal number. All lesions are summarized by sex and disposition on the Summary Incidence Tables. All lesions are summarized by sex and with sexes combined on the Incidence/Examined Summary with % Incidence Tables. All neoplasms are presented on the Neoplasm Summary Incidence Tables by sex. A correlation of gross observations with the corresponding microscopic

findings is presented in the Correlation of Gross and Microscopic Findings Tables.

MEDAKA (GROUPS 17-32) HOUSED IN DECHLORINATED TAP WATER AS DILUENT WATER

RESULTS

In medaka that were initiated with DEN, hepatocellular adenomas and hepatocellular carcinomas occurred among both males and females but the incidence of these neoplasms was higher in the males than in the females. A cholangioma occurred in one Group 20 male, a DEN-initiated control, and a cholangiocarcinoma occurred in one Group 32 male, a DEN-initiated fish exposed to 25% groundwater. One female, a DEN-initiated control medaka from Group 20, had a cholangiocarcinoma in a lobe of liver that had herniated into the pericardial cavity. Basophilic areas/foci, and/or eosinophilic areas/foci, and/or foci of cellular alteration in the liver occurred in both males and females in control groups as well as groups exposed to groundwater. In a number of medaka, basophilic or eosinophilic foci and/or foci of cellular alteration occurred in the same fish that also had a hepatocellular neoplasm. A few medaka had two different kinds of foci in the same fish. Following in Tables 1 and 2 are tabulations with the replicate groups combined of the incidences of liver neoplasms and areas/foci in males (Table 1) and females (Table 2) initiated with DEN.

TABLE 1

Incidences of Liver Neoplasms and Areas/Foci in Male Medaka Initiated with DEN				
Group Numbers	19/20	23/24	27/28	31/32
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(40)	(30)	(36)	(29)
Cholangioma	1[1]	0	0	0
Cholangiocarcinoma	0	0	0	1[1]
Hepatocellular Adenoma	5	2	3[2]	9[2]
Hepatocellular Adenoma, Multiple	0	1	2	2
Hepatocellular Carcinoma	3[3]	2	1	2
Basophilic Areas/Foci	12	4[3]	3	3
Eosinophilic Areas/Foci	7[4]	9	4	8
Foci of Cellular Alteration	1[3]	3	1	1

[1]This fish also had a hepatocellular adenoma.
[2]One of these fish also had a hepatocellular carcinoma.
[3]One of these fish died early.
[4]Two of these fish died early.

TABLE 2

Incidences of Liver Neoplasms and Areas/Foci in Female Medaka Initiated with DEN				
Group Numbers	19/20	23/24	27/28	31/32
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(30)	(37)	(31)	(38)
Cholangioma	0	0	0	0
Cholangiocarcinoma	1	0	0	0
Hepatocellular Adenoma	1	3[1]	3	4
Hepatocellular Adenoma, Multiple	0	0	0	1
Hepatocellular Carcinoma	0	0	0	1
Basophilic Areas/Foci	7	10[1]	9	13
Eosinophilic Areas/Foci	0	3	1	4
Foci of Cellular Alteration	2[2]	1	0	1

[1]One of these fish died early.
[2]Two of these fish died early.

Among the male medaka initiated with DEN, hepatocellular neoplasms occurred in 5 of 30 fish (17%) exposed to 1% groundwater, five of 36 fish (14%) exposed to 5% groundwater and 12 of 29 fish (41%) exposed to 25% groundwater. Among control medaka eight of 40 fish (20%) had a hepatocellular neoplasm. There appears to be a promotional effect of the groundwater on the development of hepatocellular neoplasms in male medaka at the 25% concentration level. There is no dose relationship in incidence of liver neoplasms or areas/foci.

Among the female medaka initiated with DEN, there is an increase in the percentage of medaka with hepatocellular neoplasms from the controls to the medaka exposed to 25% groundwater (controls-3%; 1% groundwater-8%; 5% groundwater-10%; 25% groundwater-16%). There appears to be a trend of increasing number of hepatocellular neoplasms, but the differences between groups in number of neoplasms are not great. There is no dose relationship in incidence of areas/foci.

Following in Tables 3 and 4 are incidences of liver neoplasms and areas/foci in male (Table 3) and female (Table 4) medaka that were not exposed to DEN. One medaka in Group 26 had both a hepatocellular adenoma and an eosinophilic focus.

TABLE 3

Incidences of Liver Neoplasms and Areas/Foci in Male Medaka Not Initiated with DEN				
Group Numbers	17/18	21/22	25/26	29/30
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(36)	(22)	(31)	(32)
Hepatocellular Adenoma	1	0	3	2[1]
Hepatocellular Carcinoma	1	1	1[2]	0
Basophilic Areas/Foci	1	1	0	0
Eosinophilic Areas/Foci	2	0	2	1

[1]One of these fish had multiple adenomas.
[2]This fish died early.

TABLE 4

Incidences of Liver Neoplasms and Areas/Foci in Female Medaka Not Initiated with DEN				
Group Numbers	17/18	21/22	25/26	29/30
Groundwater Concentration	0	1%	5%	25%
Total Number Medaka	(39)	(37)	(38)	(28)
Hepatocellular Adenoma	0	0	1[1]	0
Hepatocellular Carcinoma	1	0	0	1
Basophilic Areas/Foci	1	0	2	0

[1]This fish died early.

The incidence of liver neoplasms and areas/foci among male and female medaka that were not treated with DEN was less than in medaka initiated with DEN. There was no dose relationship in neoplasms or areas/foci among the males or the females, but there were more total neoplasms and areas/foci among the males than among the females. There

appears to be no effect of groundwater on the incidence of liver neoplasms or foci in either male or female medaka that were not initiated with DEN.

Hepatocellular vacuolation in the liver occurred to some degree in about 92% of the medaka. Among females the severity of the vacuolation varied from minimal to moderately severe and among males the severity varied from minimal to severe. A vacuolated hepatocyte focus is characterized by a discrete area of hepatocytes that are vacuolated to a greater degree than the surrounding hepatocytes. Vacuolated hepatocyte foci occurred in 101 of 278 female medaka and in 59 of 256 male medaka. The change occurred more frequently among male and female medaka that had been exposed to DEN than among those medaka not exposed to DEN. Cystic degeneration in the liver occurred among males and females in all groups, but more female medaka than male medaka had the change. Severity of cystic degeneration varied from minimal to moderate in females and from minimal to moderately severe in males. There were no marked differences among the groups in incidence of cystic degeneration with respect to groundwater concentration or DEN exposure. The incidence of hepatic cysts in the liver was greater among female medaka than among male medaka. The incidence, however, was not related in either sex to groundwater concentration or DEN initiation.

A number of other liver changes were diagnosed, but the incidence, distribution and severity were such that they did not appear to be related to exposure. These changes are tabulated on the Summary Incidence Tables.

Hyaline material in the glomeruli of the kidney occurred in four female medaka and six male medaka. Five of the males with hyaline material in the glomeruli also had a hepatocellular neoplasm or hepatocellular neoplasms. All males so affected were in exposure groups that had been initiated with DEN. The female medaka with hyaline material in glomeruli did not have liver neoplasia and were in exposure groups that had not been initiated with DEN. The association of hyaline material in glomeruli with liver neoplasms is not a consistent finding. For a further discussion of this relationship see the pathology summary for the six month interim sacrifice of medaka from the West Branch Canal Creek Carcinogenicity Study with Medaka.

Other changes that occurred commonly in the kidney throughout all groups were tubular dilatation and tubular casts. These changes occurred more frequently among the males than among the females but neither the incidence nor the severity of these changes occurred in a dose related or exposure related manner. Tubular degeneration and tubular mineralization, when they occurred, usually were in medaka that also had tubular casts and/or tubular dilatation. Other kidney changes occurred sporadically among the groups and are tabulated in the Summary Incidence Tables. These changes usually occurred in small numbers of medaka, and there was no apparent relationship to exposure.

Increased basophilia of the follicular cells of the thyroid tissue occurred in most of the male medaka and in a few of the female medaka. The incidences among the groups did not appear to be related to exposure to groundwater. Other thyroid tissue changes such as

hyperplasia, vacuolation of follicular cells and hypertrophy of follicular cells were also more frequent among males than females. Hyperplasia of thyroid tissue occurred in only two control males not initiated with DEN and was generally less frequent in groups not initiated with DEN. One Group 17 male medaka had a follicular cell adenoma of the thyroid. Although the reason is not known, these thyroid changes appear to be sex related and occur more frequently as the age of the medaka increases.

In the gills there were fusion of gill lamellae and hyperplasia of gill epithelium among males and females in all groups, but the incidence was slightly higher in female medaka. The severity varied from minimal to moderate, and there was a slight increase in severity, in general, in medaka exposed to groundwater over control medaka. There was a mild dose response evident for these two gill lesions in males and females when only groups exposed to DEN initiation were considered. Other gill lesions occurred sporadically or the distribution was such that there was no relationship to exposure.

Granulomas occurred among both male and female medaka in a variety of tissues, but there was no relationship between granuloma incidence and exposure to groundwater for specific tissues in which granulomas occurred. The incidence of granulomas was highest in the hematopoietic tissue. More males than females had granulomas in this tissue. More than half of the males with granulomas in hematopoietic tissue also had granulomatous inflammation of the skin of the jaw, an area which may have served as a point of entry for organisms, such as

acid-fast bacteria, that may have caused the granulomas. Special stains were not done to verify the presence of organisms in the granulomas.

A variety of neoplasms in different tissues occurred sporadically throughout the groups among males and females. The incidence of these neoplasms in each group was small (one or two) and could not be attributed to exposure to groundwater. These neoplasms are tabulated in Table 5 below.

TABLE 5

Incidences of Various Neoplasms Other Than Liver Neoplasms

Group Numbers	17/18	19/20	21/22	23/24	25/26	27/28	29/30	31/32
Groundwater Concentration	0	0	1%	1%	5%	5%	25%	25%
DEN (mg/L)	0	10	0	10	0	10	0	10
Nares Neurogenic Neoplasm	-	1[1]	-	-	-	-	-	-
Ovary Seminoma	-	-	1	-	-	-	-	2
Skeletal Muscle Sarcoma, NOS	-	1[2]	-	-	-	-	-	-
Skin Papilloma	1[1]	1[1]	-	-	-	-	-	-
Swim Bladder Epithelioma	1[1]	-	-	-	-	1[1]	1[1]	-
Testis Seminoma	-	-	1	-	-	-	1	-
Thymus Lymphosarcoma and Lymphosarcoma (early)	1[2]	-	-	-	2[1]	2[1]	2[2]	2[2]
Thyroid Tissue Follicular Cell Adenoma	1[1]	-	-	-	-	-	-	-

[1]Male Medaka
[2]Female Medaka

The seminoma in the testis of Group 30 male medaka No. 49 and in the ovary of Group 32 female medaka No. 28 had metastasized to the

heart, hematopoietic tissue and spleen (and to the choroid rete of the eye in medaka No. 32-28). The seminoma cells that were present in tissues other than gonad were germ cells that had matured to the spermatid/sperm stage. Medaka No. 32-28 had a thymic lymphosarcoma in addition to the seminoma.

Male medaka No. 18-34 had both a papilloma of the skin of the lower jaw and a swim bladder epithelioma. Male medaka No. 20-28 had both a neurogenic neoplasm of the nares and a papilloma on the skin of the lower jaw.

A variety of non-neoplastic lesions in a number of different tissues occurred sporadically among medaka and are tabulated in the Summary Incidence Tables. These lesions either occurred in only a few fish or, if they occurred in both control and exposed groups, neither the incidence nor the severity suggested a relationship to exposure to groundwater.

CONCLUSIONS

Among the male medaka initiated with DEN there was no dose relationship in incidence of liver neoplasms or areas/foci, but there appeared to be a promotional effect of groundwater on the development of hepatocellular neoplasms at the 25% concentration level based on the increased incidence of hepatocellular neoplasms at this level over controls. Among the female medaka initiated with DEN there was a trend based on an increase in the percentage of medaka with hepatocellular neoplasms from the controls to the 25% groundwater concentration, but

the difference in numbers of neoplasms between groups was small. There was no dose relationship in incidence of areas/foci.

There was no effect of groundwater on the incidence of liver neoplasms or foci in either male or female medaka that were not initiated with DEN.

MEDAKA (GROUPS 33-36) HOUSED IN LABORATORY WELL WATER AT FORT DETRICK, MARYLAND

RESULTS

Only one liver neoplasm occurred among the medaka housed in laboratory well water. A female medaka from Group 36 that had been initiated with DEN had a hepatocellular adenoma. Table 6 below tabulates the liver neoplasms and areas/foci from the laboratory control medaka.

TABLE 6

Incidences of Liver Neoplasms and Areas/Foci in Male and Female Medaka

Group Numbers	33/34		35/36	
Sex	Male	Female	Male	Female
DEN (mg/L)	0		10	
Total Number Medaka	(33)	(43)	(40)	(34)
Hepatocellular Adenoma	0	0	0	1
Basophilic Focus/Foci	1	0	0	1
Eosinophilic Area(s)	0	1	0	0
Focus of Cellular Alteration	0	0	1	0

Hepatocellular vacuolation of minimal to moderate severity occurred in 42% of medaka in all four laboratory control groups. Among

severe, and the same medaka also had a mild granulomatous inflammation in the submucosa of the oral cavity.

Increased basophilia of the follicular cells of the thyroid tissue was diagnosed in most of the male medaka (minimal to moderate severity) from all groups and in a few of the female medaka (minimal severity) from all groups. Hyperplasia of minimal to mild severity occurred only in male medaka in 28 of 73 males. Hypertrophy of follicular cells and vacuolation of follicular cells also occurred only in males and in relatively small numbers of medaka.

There were a few neoplasms in tissues other than liver among the laboratory control medaka. One Group 36 male medaka had a seminoma in the testis. Two Group 33 females had seminomas in the ovary. One Group 34 female had a thymic lymphosarcoma.

CONCLUSIONS

Only one liver neoplasm occurred among the laboratory controls held in well water. A Group 36 female had a hepatocellular adenoma. Other neoplasms included a seminoma in the testis of one male, seminomas in the ovaries of two females and a thymic lymphosarcoma in one female.

Non-neoplastic lesions occurred in a variety of tissues and were usually sporadic among the groups affecting relatively small numbers of medaka. Hepatocellular vacuolation in the liver, which affected 42% of the medaka in laboratory well water, occurred in fewer medaka that had DEN initiation than in medaka with no DEN exposure. Cystic degeneration in the liver occurred more frequently among female than male medaka, and a

both males and females there were fewer fish affected in the groups that had DEN initiation versus the groups that were not exposed to DEN. Cystic degeneration of the liver of minimal severity occurred in a small number of males from all groups, and there were no differences in incidence with respect to DEN initiation. Among female medaka cystic degeneration was minimal to mild in severity and the incidence was slightly greater than in males. Vacuolated hepatocyte foci of minimal to mild severity occurred in small numbers of both male and female medaka from all groups. Hepatic cysts occurred in a small number of medaka but were more frequent among females than among males. A few other liver changes occurred sporadically among the groups and are tabulated in the Summary Incidence Tables.

Hyaline material in the glomeruli of the kidney occurred in one Group 33 female medaka that had no liver neoplasia. Tubular dilatation (usually minimal to mild) and tubular casts (minimal to mild) in the kidney occurred in small numbers of medaka from all groups. One Group 36 female had moderately severe tubular dilatation. Tubular degeneration and tubular mineralization when they occurred, with one exception, were in medaka that also had tubular casts and/or tubular dilatation.

In the gills there were fusion of gill lamellae and hyperplasia of gill epithelium among males and females of all groups. The severity varied from minimal to moderate, but was minimal in most of the medaka. There were no differences in incidence based on DEN exposure.

Granulomas occurred in small numbers among both male and female medaka in a variety of tissues. Only one medaka, a Group 33 male, had granulomas in the hematopoietic tissue. The granulomas were moderately

slightly greater number of females were affected in groups not initiated with DEN than in groups exposed to DEN.

Fusion of gill lamellae and hyperplasia of gill epithelium occurred among males and females of all groups and affected 67% of the males and approximately 60% of the females, but the changes were minimal in approximately 80% of the affected medaka.

SUMMARY COMPARISON OF FINDINGS IN MEDAKA HELD IN DECHLORINATED TAP WATER OR LABORATORY WELL WATER

Among male and female medaka that were initiated with DEN and housed in dechlorinated tap water as diluent water, liver neoplasia occurred in controls and in groups exposed to 1%, 5% and 25% groundwater. The incidence was higher among males than females with the highest incidence in males exposed to 25% groundwater. (See Tables 1 and 2.) Basophilic foci, eosinophilic foci and foci of cellular alteration in the liver occurred among both male and female medaka exposed to DEN. The incidence in each exposure group did not reflect a dose response among either the males or the females.

There were no liver neoplasms in male medaka exposed to DEN and housed in laboratory well water for nine months. By comparison the control males exposed to DEN and held in dechlorinated tap water in the trailer had an incidence of eight medaka with hepatocellular neoplasms with one fish having both a hepatocellular adenoma and a cholangioma. One focus of cellular alteration occurred among the laboratory control male medaka initiated with DEN in contrast to an incidence of 20 foci (all types

combined) among the comparable male controls housed in dechlorinated tap water. One male medaka had both a basophilic and an eosinophilic focus so that there was a total of 19 medaka with foci.

One female medaka exposed to DEN and housed in laboratory well water for nine months had a hepatocellular adenoma and one had a basophilic focus. By comparison in the control female medaka exposed to DEN and held in dechlorinated tap water in the trailer, one medaka had a hepatocellular adenoma, one had a cholangiocarcinoma and eight medaka had various foci (one medaka had both basophilic foci and basophilic areas).

There were no liver neoplasms in either male or female medaka with no DEN exposure and housed in laboratory well water. One male medaka had a basophilic focus in the liver and one female medaka had an eosinophilic focus in the liver. By comparison, two control males not exposed to DEN and held in dechlorinated tap water had liver neoplasms (one had a hepatocellular adenoma and one had a hepatocellular carcinoma). Three control males had either basophilic or eosinophilic foci. One control female not exposed to DEN and held in dechlorinated tap water had a hepatocellular carcinoma and one had a basophilic focus.

Overall the incidence and severity of hepatocellular vacuolation and cystic degeneration in the liver was less among the male and female laboratory well water controls than among the male and female dechlorinated tap water controls.

Among male medaka controls the incidence and severity of tubular dilatation and tubular casts in the kidney were less in those held in laboratory well water versus those held in dechlorinated tap water.

Hyperplasia of gill epithelium and fusion of gill lamellae occurred at a higher incidence among control male medaka held in laboratory well water than among control male medaka held in dechlorinated tap water. The incidence of these gill lesions was comparable among female control medaka regardless of the water in which they were held.

Lymphosarcoma occurred in one control female medaka held in laboratory well water and in one control female medaka held in dechlorinated tap water. Among the groundwater exposure groups lymphosarcoma occurred in two Group 26 male medaka (0 mg/L DEN, 5% groundwater), in two Group 28 male medaka (10 mg/L DEN, 5% groundwater), one Group 29 and one Group 30 female medaka (0 mg/L DEN, 25% groundwater) and two Group 32 female medaka (10 mg/L DEN, 25% groundwater). The incidence of lymphosarcoma is unrelated to exposure to groundwater or DEN initiation.

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APR 2 2 1996

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FINAL DRAFT

SUMMARY COMPARISON OF FINDINGS AT SIX AND NINE MONTHS IN MEDAKA HELD IN CANAL CREEK WATER, DECHLORINATED TAP WATER AND LABORATORY WELL WATER

HEPATOCELLULAR NEOPLASMS

Groups Initiated with DEN and Exposed to 0, 1, 5 or 25% Groundwater in Canal Creek Water as Diluent Water for Six Months and in Dechlorinated Tap Water for the Final Three Months of the Study

In general the number of hepatocellular neoplasms observed at nine months was greater than the number observed at six months in both male and female medaka. An exception was that there were fewer hepatocellular neoplasms among Groups 3/4 (control) males at nine months than at six months.

Overall hepatocellular neoplasms were more numerous among males than among females. At six months the number of medaka with a hepatocellular neoplasm(s) was the same in males and females in Groups 7/8 and 11/12.

Hepatocellular neoplasms (both adenomas and carcinomas combined) are summarized below in Table 1 for the medaka described in the title of this section.

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TABLE 1

Incidences of Fish with Hepatocellular Neoplasms in Male and Female Medaka Initiated with DEN and Housed in Canal Creek Water as Diluent Water								
	6 Mon.	9 Mon.	**6 Mon.**	9 Mon.	**6 Mon.**	9 Mon.	**6 Mon.**	9 Mon.
Group Nos.	**3/4**	3/4	**7/8**	7/8	**11/12**	11/12	**15/16**	15/16
Groundwater Conc.	**0**	0	**1%**	1%	**5%**	5%	**25%**	25%
Total Male Medaka	**(20)**	(17)	**(19)**	(25)	**(21)**	(17)	**(25)**	(22)
Hepatocellular Neoplasms	**7**	1	**3**[1]	10[2]	**2**	6	**10**	14[2]
Percentage of Neoplasms	**35%**	6%	**16%**	40%	**10%**	35%	**40%**	64%
Total Female Medaka	**(21)**	(32)	**(21)**	(13)	**(19)**	(26)	**(15)**	(21)
Hepatocellular Neoplasms	**3**	8	**3**	4	**2**	5	**2**	5
Percentage of Neoplasms	**14%**	25%	**14%**	31%	**11%**	19%	**13%**	24%

[1]One fish died early.
[2]Two of these fish died early.

At six months among male medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasms. At nine months among male medaka there appeared to be a promotional effect of the groundwater on hepatocellular neoplasia based on the apparently low incidence of hepatocellular neoplasms in controls (one in 17). This low incidence may be spurious in light of the incidence of hepatocellular neoplasms in DEN-initiated control males from the six month sacrifice (7 of 20 fish) and the incidence in DEN-initiated control males in dechlorinated tap water from the nine month sacrifice

(8 of 40 fish). If it is speculated that the "one in 17" control incidence probably should have been higher (six to eight) then the conclusions might be that there is a slight groundwater effect on hepatocellular neoplasia at the 25% concentration and that there is a continuing promotional effect of the Canal Creek water on all groups of males initiated with DEN.

At six months among female medaka there appeared to be a promotional effect of the Canal Creek water on hepatocellular neoplasia. At six months and nine months among female medaka there was no effect of the groundwater on hepatocellular neoplasia. The number of medaka with hepatocellular neoplasia increased at nine months over six months in all groups and at nine months the incidence was greatest among control Groups 3/4 (8 of 32 affected). This distribution of neoplasms indicates that the promotional effect of the Canal Creek water which was evident at six months was still evident at nine months even though the fish were not exposed to Canal Creek water for the last three months of the study.

Groups Initiated with DEN and Exposed to 0, 1, 5 or 25% Groundwater in Dechlorinated Tap Water for Six Months and Nine Months

In general the number of hepatocellular neoplasms observed at nine months was greater than the number observed at six months. An exception was that only one of 17 female medaka at six months had a hepatocellular neoplasm in Groups 19/20 and only one in 30 female medaka at nine months had a hepatocellular neoplasm in Groups 19/20.

Overall, neoplasms were more numerous among males than females. An exception was that at six months one female in Groups 19/20 (controls) had a hepatocellular neoplasm and no males in Groups 19/20 had hepatocellular neoplasia.

Hepatocellular neoplasms (both adenomas and carcinomas combined) are summarized below in Table 2 for the medaka described in the title of this section.

TABLE 2

Incidences of Fish with Hepatocellular Neoplasms in Male and Female Medaka Initiated with DEN and Housed in Dechlorinated Tap Water as Diluent

	6 Mon.	9 Mon.	**6 Mon.**	9 Mon.	**6 Mon.**	9 Mon.	**6 Mon.**	9 Mon.
Group Nos.	**19/20**	19/20	**23/24**	23/24	**27/28**	27/28	**31/32**	31/32
Groundwater Conc.	**0**	0	**1%**	1%	**5%**	5%	**25%**	25%
Total Male Medaka	**(21)**	(40)	**(24)**	(30)	**(20)**	(36)	**(19)**	(29)
Hepatocellular Neoplasms	**0**	8[1]	**2**	5	**2**	5	**3**	12
Percentage of Neoplasms	**0%**	20%	**8%**	17%	**10%**	14%	**16%**	41%
Total Female Medaka	**(17)**	(30)	**(16)**	(37)	**(19)**	(31)	**(21)**	(38)
Hepatocellular Neoplasms	**1**	1	**0**	3[1]	**0**	3	**1**	6
Percentage of Neoplasms	**6%**	3%	**0%**	8%	**0%**	10%	**5%**	16%

[1]One of these fish died early.

At six months among male medaka there was no effect of groundwater on hepatocellular neoplasia. At nine months there appeared to be a promotional effect of the groundwater at 25% concentration on hepatocellular neoplasia in male medaka (12 of 29 fish affected), although eight of 40 control medaka also had hepatocellular neoplasia at nine months.

At six months among the female medaka there was no effect of groundwater on hepatocellular neoplasia. At nine months there appeared to be a trend of increasing percentage of hepatocellular neoplasms from controls to medaka in 25% groundwater, but the differences between groups in number of neoplasms was not great.

Groups Not Initiated with DEN and Exposed to 0, 1, 5 or 25% Groundwater in Canal Creek Water as Diluent Water for Six Months and in Dechlorinated Tap Water for the Final Three Months of the Study

At six months among male and female medaka there was no effect of either Canal Creek water or groundwater on the incidence of hepatocellular neoplasia. At nine months among the males there was a slight effect of 25% groundwater concentration on the incidence of hepatocellular neoplasia (three of 25 medaka had hepatocellular neoplasia versus one medaka with hepatocellular neoplasia in each of the other three exposure concentrations). At nine months among the females there was no effect of groundwater exposure on hepatocellular neoplasia.

Groups Not Initiated with DEN and Exposed to 0, 1, 5 or 25% Groundwater in Dechlorinated Tap Water as Diluent Water for Six Months and Nine Months

At six months and at nine months among male and female medaka there was no effect of groundwater on the incidence of hepatocellular neoplasia.

Groups Initiated and Not Initiated with DEN and Housed in Laboratory Well Water for Six Months and Nine Months

At six months there were no hepatocellular neoplasms diagnosed among medaka of either sex. At nine months one hepatocellular adenoma occurred in a female medaka that had been initiated with DEN.

NEOPLASMS OTHER THAN HEPATOCELLULAR NEOPLASMS

Neoplasms other than hepatocellular neoplasms occurred sporadically among male and female medaka with no regard to DEN initiation or the type of diluent water in which the medaka were housed. Lymphosarcoma was the most common among these sporadic neoplasms.

NON-NEOPLASTIC LESIONS

A number of non-neoplastic lesions occurred in a variety of tissues in both male and female medaka housed in Canal Creek water, dechlorinated tap water or laboratory well water. There was an interesting association of the occurrence of hyaline material in the

glomeruli of the kidney in medaka that also had hepatocellular neoplasia, although these two lesions did not consistently occur together in the same fish. Tubular dilatation and tubular casts were common changes in the kidney that occurred more frequently among male medaka than among female medaka. Tubular degeneration and tubular mineralization, when they occurred, usually were in medaka that also had tubular casts and/or tubular dilatation.

Metazoan parasites, usually associated with granulomas, were present in a variety of tissues only in medaka that were exposed to Canal Creek water. This finding is not unexpected in fish exposed to a natural surface water which would harbor such organisms.

Increased basophilia of thyroid tissue was consistently more common among male medaka than among female medaka regardless of diluent water type or exposure to groundwater. Among medaka housed in Canal Creek water for six months and then in dechlorinated tap water for three months, 19% of the females had increased basophilia of thyroid tissue although it was usually of minimal severity. This percentage in females, however, was higher than the percentage incidence in females housed in dechlorinated tap water or laboratory well water for six months or nine months or in Canal Creek water for six months.

A common gross observation made at necropsy among female medaka was a large, or inflamed, or swollen anal passage or opening. At gross trimming these observations were related to a bulge of tissue in the area of the anus identified as the urinogenital papillae, an anatomic sex characteristic of female medaka. Histologically the

urinogenital papillae of a number of fish were notably larger than in others and diagnoses of hypertrophy and/or hyperplasia of the covering epithelium were made. Enlarged urinogenital papillae were noted grossly more often in medaka exposed to Canal Creek water for six months and then to dechlorinated tap water for the last three months of the study than in medaka exposed to dechlorinated tap water for nine months. There was no relationship of incidence of enlargement of urinogenital papillae to groundwater or DEN exposure. It is known that the size of the papillae may vary with the breeding season of medaka, and, experimentally, that the size may be altered by exposure to female or male hormones. An explanation for the greater incidence of enlarged papillae in medaka exposed to Canal Creek water than in medaka exposed to dechlorinated tap water is not readily apparent.

Lesions occurred in other tissues not discussed in this summary. See the individual reports for more details on all the findings in the "West Branch Canal Creek Carcinogenicity Study with Medaka."

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APPENDIX 58

COMPREHENSIVE CHEMICAL ANALYSES CONDUCTED ON RAW (pH ≈4) CANAL CREEK GROUNDWATER (WELL CC-27B), WEST BRANCH OF CANAL CREEK WATER, APG-EA TAP WATER, AND CHRONIC HISTOPATHOLOGY EXPOSURE TANKS

TABLE A58-1A. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY GROUNDWATER (WELL NO. CC-27B), WEST BRANCH OF CANAL CREEK SURFACE WATER, AND APG-EA TAP WATER (TEST NO. 1) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Alkalinity ($CaCO_3$)	310.1	1.0	<1.0	61.2	30
Ammonia Nitrogen (N)	350.3	0.01	0.035	0.052	0.032
Bromide	320.1	0.2	<0.2	0.4	<0.2
Chloride (Cl)	508	1.0	78.6	109	23.8
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.349	0.200	0.449
Hardness ($CaCO_3$)	AA	_	63.5	95.6	67.0
pH (electrometric)	150.1	_	4.08	6.70	6.69
Nitrate (N)	ISE	0.01	1.97	0.591	3.01
Nitrite (N)	354.1	0.001	<0.001	<0.001	<0.001
Phosphate (P)	365.3	0.01	0.151	0.153	0.302
Specific Conductance @ 25 °C	120.1	1.0	427	477	188
Sulfate (SO_4)	375.3	1.0	103	17.5	2.3
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	2.6	8.3	<2.0
Total Suspended Solids	160.2	1.0	<1.0	11.6	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-1A. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Aluminum (Al)	200.7	25.6	2380	250	37.3
Antimony (Sb)	200.7	14.1	<14.1	<14.1	<14
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	1.8	<0.5	<0.5
Boron	200.7	10	352	233	90.3
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	17000	19600	18900
Chromium (Cr)	200.7	6	<6	<5	<6
Cobalt	200.7	1.3	45.9	2.6	1.9
Copper (Cu)	200.7	3	16.6	6.8	9.9
Iron	200.7	2.5	5.5	1250	12.0
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29.5	5990	13300	5630
Manganese (Mn)	200.7	0.97	734	175	<0.97
Mercury (Hg)	245.1	0.1	0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	28.9	<28.9	<28.9	<28.9
Nickel (Ni)	200.7	2.9	24.0	4.2	6.5
Potassium (K)	200.7	40	2000	3840	2210
Selenium (Se)	200.7	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	6.7	<6.7	<6.7	<6.7
Sodium (Na)	200.7	30	60500	61600	9630
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	88.4	44.8	251

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	0.78	ND	3.3
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	57.7	16.8	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	103	15.3	19.2
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	0.53	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	3.5	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
cis-1,2-Dichloroethene	8021	0.5	1.3	0.59	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	57.8	7.98	ND
Tetrachloroethene	8021	0.5	3.49	3.02	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	0.6	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	1.08	0.51	ND
Trichloroethene	8021	0.5	64.4	1.74	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND[b]	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.
[b] A spurious result of 0.52 $\mu g/L$ was originally reported; the error was corrected by the analytical laboratory.

TABLE A58-1A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	ND
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1A. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Herbicides:					
2,4-D	8150	1.500	ND	ND	ND
2,4,5-TP	8150	0.075	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1B. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH APG-EA TAP WATER (TEST NO. 1) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	20.0	27.6	29.6
Ammonia Nitrogen (N)	350.3	0.01	0.054	0.053	0.051
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	508	1.0	37.3	26.3	24.3
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.426	0.469	0.480
Hardness ($CaCO_3$)	AA	_	67.8	67.5	68.4
pH (electrometric)	150.1	_	6.60	6.90	6.89
Nitrate (N)	ISE	0.01	2.67	2.91	2.97
Nitrite (N)	354.1	0.001	<0.001	<0.001	<0.001
Phosphate (P)	365.3	0.01	0.311	0.302	0.364
Specific Conductance @ 25 °C	120.1	1.0	254	199	192
Sulfate (SO_4)	375.3	1.0	29.1	15.8	14.1
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	4.6	2.7	4.4
Total Suspended Solids	160.2	1.0	<1.0	<1.0	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-1B. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	25.6	677	139	64.8
Antimony (Sb)	200.7	14.1	<14.5	<14.1	<14.1
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	<0.5	<0.5	<5
Boron	200.7	10	188	221	155
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	19000	19000	19400
Chromium (Cr)	200.7	6	<6	<6	<6
Cobalt	200.7	1.3	10.9	2.9	<1.3
Copper (Cu)	200.7	3	6	<3	10.3
Iron	200.7	2.5	14.5	14.5	7.9
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29.5	5790	5710	5680
Manganese (Mn)	200.7	0.97	187	36.5	8.7
Mercury (Hg)	245.1	0.1	0.13	<0.1	<0.1
Molybdenum (Mo)	200.7	28.9	<28.9	<28.9	b
Nickel (Ni)	200.7	2.9	10.5	<2.9	b
Potassium (K)	200.7	40	2190	2190	b
Selenium (Se)	200.7	11.1	<11.1	<11.1	b
Silver (Ag)	200.7	6.7	<6.7	<6.7	b
Sodium (Na)	200.7	30	22300	12200	b
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	196	207	227

[a] All results expressed as $\mu g/L$.
[b] Result not reported because of an error in the anaytical laboratory report.

TABLE A58-1B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	1.88	2.38	2.41
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	6.43	1.41	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	22.0	14.7	12.4
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	10.5	2.32	ND
Tetrachloroethene	8021	0.5	ND	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	0.51	ND	ND
Trichloroethene	8021	0.5	7.33	1.75	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-1B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1B. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	ND
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-1B. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1B. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.500	ND	ND	ND
2,4,5-TP	8150	0.075	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH WEST BRANCH OF CANAL CREEK WATER (TEST NO. 1) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	47.6	58.2	60.4
Ammonia Nitrogen (N)	350.3	0.01	0.087	0.102	0.091
Bromide	320.1	0.2	<0.2	0.3	0.3
Chloride (Cl)	508	1.0	117	126	132
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.215	0.227	0.211
Hardness ($CaCO_3$)	AA	—	88.4	96.2	97.5
pH (electrometric)	150.1	—	6.62	6.94	b
Nitrate (N)	ISE	0.01	1.04	0.670	0.636
Nitrite (N)	354.1	0.001	0.001	0.002	0.002
Phosphate (P)	365.3	0.01	0.153	0.224	0.134
Specific Conductance @ 25 °C	120.1	1.0	516	530	561
Sulfate (SO_4)	375.3	1.0	38.8	22.5	18.8
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	6.8	7.0	7.5
Total Suspended Solids	160.2	1.0	4.9	5.1	6.1

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as µmhos/cm and standard units, respectively.

[b] Result not reported because of an error in the analytical laboratory report.

TABLE A58-1C. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W
Aluminum (Al)	200.7	25.6	533	319	174
Antimony (Sb)	200.7	14.1	<14.1	<14.1	<14.1
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	<0.5	<0.5	<0.5
Boron	200.7	10	255	482	172
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	18100	18600	18700
Chromium (Cr)	200.7	6	<6	<6	<6
Cobalt	200.7	1.3	10.6	<1.3	2.8
Copper (Cu)	200.7	3	7.5	8.2	7.7
Iron	200.7	2.5	872	1100	950
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29.5	12300	14200	14500
Manganese (Mn)	200.7	0.97	303	130	96.9
Mercury (Hg)	245.1	0.1	0.19	<0.1	0.24
Molybdenum (Mo)	200.7	28.9	<28.9	<28.9	<28.9
Nickel (Ni)	200.7	2.9	13.4	15.5	5.0
Potassium (K)	200.7	40	3610	4240	4440
Selenium (Se)	200.7	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	6.7	<6.7	<6.7	<6.7
Sodium (Na)	200.7	30	66500	73000	73100
Thallium	200.7	75.9	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	42.6	45.8	32.4

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	12.3	8.1	7.51
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	22.1	10.1	9.33
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	0.71	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	15.5	6.26	5.02
Tetrachloroethene	8021	0.5	1.59	1.52	1.62
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	[b]	0.71	0.67
Trichloroethene	8021	0.5	8.6	2.42	1.15
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as μg/L.
[b] Result not given in analytical laboratory report.

TABLE A58-1C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-1C. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	ND
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-1C. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Herbicides:					
2,4-D	8150	1.500	ND	ND	ND
2,4,5-TP	8150	0.075	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY GROUNDWATER (WELL NO. CC-27B), WEST BRANCH OF CANAL CREEK SURFACE WATER, AND APG-EA TAP WATER (TEST NO. 2) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Alkalinity ($CaCO_3$)	310.1	1.0	<1	57.2	31.0
Ammonia Nitrogen (N)	350.3	0.01	0.055	0.272	0.050
Bromide	320.1	0.2	<0.2	<0.02?	<0.2
Chloride (Cl)	508	1.0	77.2	487	22.5
Cyanide (Cn)	335.2	0.002	<0.005	<0.005	<0.005
Fluoride (F)	340.2	0.01	0.307	0.178	0.854
Hardness ($CaCO_3$)	AA	_	59.5	123	65.2
pH (electrometric)	150.1	_	4.28	6.53	6.98
Nitrate (N)	ISE	0.01	1.91	1.32	2.43
Nitrite (N)	354.1	0.001	<0.001	0.012	<0.001
Phosphate (P)	365.3	0.01	0.428	0.784	0.674
Specific Conductance @ 25 °C	120.1	1.0	336	674	172
Sulfate (SO_4)	375.3	1.0	94.0	41.6	20.6
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	<2.0	6.5	<2.0
Total Suspended Solids	160.2	1.0	<1.0	42.3	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-2A. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Aluminum (Al)	200.7	25.6	2090	846	214
Antimony (Sb)	200.7	14.1	<14.1	<14.1	<14.1
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	<0.5	<0.5	<0.5
Boron	200.7	10	409	351	490
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	16000	21700	18500
Chromium (Cr)	200.7	6	<6	8.7	<6
Cobalt	200.7	1.3	44.6	5.2	<1.3
Copper (Cu)	200.7	3	24.4	12.5	45.7
Iron	200.7	2.5	34.5	2820	41.8
Lead (Pb)	200.7	14.5	<14.5	16.3	<14.5
Magnesium (Mg)	200.7	29.5	5580	19700	5410
Manganese (Mn)	200.7	0.97	848	942	2.9
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	28.9	<28.9	<20?	<28.9
Nickel (Ni)	200.7	2.9	24.7	11.3	12.6
Potassium (K)	200.7	40	2010	5720	3440
Selenium (Se)	200.7	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	6.7	<13.6	<13.6	<13.6
Sodium (Na)	200.7	30	61300	126000	10400
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	78.4	98.1	272

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	97.9	2.1	5.3
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	55.9	15.1	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	1.7
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	54.0	8.5	29.5
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	2.5	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
cis-1,2-Dichloroethene	8021	0.5	1.3	0.9	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	57.1	7.4	ND
Tetrachloroethene	8021	0.5	6.0	3.0	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	91.7	3.4	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	NN
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2A. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8051?	1.5	ND	ND	ND
2,4,5-TP	8051?	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH APG-EA TAP WATER (TEST NO. 2) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	21.4	29.2	30.8
Ammonia Nitrogen (N)	350.3	0.01	0.084	0.084	0.097
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	508	1.0	36.0	25.4	23.4
Cyanide (Cn)	335.2	0.002	<0.005	<0.005	<0.005
Fluoride (F)	340.2	0.01	0.686	0.828	0.853
Hardness ($CaCO_3$)	AA	_	63.4	64.2	65.4
pH (electrometric)	150.1	_	6.60	6.75	6.92
Nitrate (N)	ISE	0.01	2.24	2.34	2.41
Nitrite (N)	354.1	0.001	<0.001	<0.001	<0.001
Phosphate (P)	365.3	0.01	0.483	0.319	0.364
Specific Conductance @ 25 °C	120.1	1.0	208	176	177
Sulfate (SO_4)	375.3	1.0	40.0	28.2	22.2
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	1.5	<1.0	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-2B. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	25.6	677	250	259
Antimony (Sb)	200.7	14.1	<14.1	<14.1	<14.1
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	<0.5	<0.5	<0.5
Boron	200.7	10	474	455	468
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	17800	18200	18600
Chromium (Cr)	200.7	6	<6	<6	<6
Cobalt	200.7	1.3	11.4	1.9	<1.3
Copper (Cu)	200.7	3	36.1	35.0	35.6
Iron	200.7	2.5	25.5	33.8	33.5
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29.5	5410	5350	5390
Manganese (Mn)	200.7	0.97	205	41.4	12.3
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	28.9	<28.9	<28.9	<28?
Nickel (Ni)	200.7	2.9	9.2	6.6	1.8?
Potassium (K)	200.7	40	2960	3290	3250
Selenium (Se)	200.7	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	6.7	<13.6	<13.6	<13.6
Sodium (Na)	200.7	30	<2700?	12400	10700
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	230	251	257

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	12.9	2.1	3.6
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	8.9	2.4	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	1.2	1.2	1.1
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	24.2	18.8	18.6
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	8.6	1.2	ND
Tetrachloroethene	8021	0.5	0.8	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	11.9	ND	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-2B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	ND
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2B. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-2B. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
Herbicides:					
2,4-D	8051?	1.5	ND	ND	ND
2,4,5-TP	8051?	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH WEST BRANCH OF CANAL CREEK WATER (TEST NO. 2) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	38.4	50.8	51.8
Ammonia Nitrogen (N)	350.3	0.01	0.218	0.238	0.249
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	508	1.0	273	323	358
Cyanide (Cn)	335.2	0.002	<0.005	<0.005	<0.005
Fluoride (F)	340.2	0.01	0.204	0.188	0.189
Hardness ($CaCO_3$)	AA	_	126	141	150
pH (electrometric)	150.1	_	6.28	6.61	6.69
Nitrate (N)	ISE	0.01	1.73	1.67	1.65
Nitrite (N)	354.1	0.001	0.008	0.019	0.03
Phosphate (P)	365.3	0.01	0.565	0.601	0.930
Specific Conductance @ 25 °C	120.1	1.0	776	854	875
Sulfate (SO_4)	375.3	1.0	63.2	53.4	57.0
Sulfide (H_2S)	376.1	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	415.1	2.0	3.7	3.8	9.6
Total Suspended Solids	160.2	1.0	18	20.7	20.1

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-2C. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W
Aluminum (Al)	200.7	25.6	851	564	545
Antimony (Sb)	200.7	14.1	<14.1	<14.1	<14.1
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	<0.5	<0.5	<0.5
Boron	200.7	10	439	472	498
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	30.6	21300	22600	23400
Chromium (Cr)	200.7	6	<6	6.9	6.2
Cobalt	200.7	1.3	13.6	5.8	5.2
Copper (Cu)	200.7	3	14.9	16.9	15.4
Iron	200.7	2.5	1470	1880	1870
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29.5	20700	24100	26300
Manganese (Mn)	200.7	0.97	806	746	671
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	28.9	<28.9	<28.9	<28.9
Nickel (Ni)	200.7	2.9	12.8	11.3	14.7
Potassium (K)	200.7	40	10600	7310	8180
Selenium (Se)	200.7	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	6.7	<13.6	<13.6	<13.6
Sodium (Na)	200.7	30	81200	169000	188000
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	77.0	76.7	88.4

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	11.9	2.5	0.9
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	11.3	6.6	5.7
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	13.2	4.7	3.3
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	9.6	3.4	2.6
Tetrachloroethene	8021	0.5	1.9	1.2	1.2
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	11.0	3.4	1.5
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	2.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	2.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	2.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	2.0	ND	ND	ND
2-Chloronapthalene	8270	2.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	2.0	ND	ND	ND
Chrysene	8270	2.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	3.0	ND	ND	ND
Acenaphthylene	8270	2.0	ND	ND	ND
1,2-Dichlorobenzene	8270	2.0	ND	ND	ND
1,3-Dichlorobenzene	8270	2.0	ND	ND	ND
1,4-Dichlorobenzene	8270	2.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	5.0	ND	ND	ND
Diethyl Phthalate	8270	2.0	ND	ND	ND
Dimethyl Phthalate	8270	5.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	2.0	ND	ND	ND
2,4-Dinitrotoluene	8270	4.0	ND	ND	ND
2,6-Dinitrotoluene	8270	4.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	2.0	ND	ND	ND
Fluoranthene	8270	2.0	ND	ND	ND
Fluorene	8270	2.0	ND	ND	ND
Hexachlorobenzene	8270	2.0	ND	ND	ND
Hexachlorobutadiene	8270	3.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	5.0	ND	ND	ND
Hexachloroethane	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	3.0	ND	ND	ND
Isophorone	8270	2.0	ND	ND	ND
Naphthalene	8270	2.0	ND	ND	ND
Anthracene	8270	2.0	ND	ND	ND
Nitrobenzene	8270	4.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	4.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	4.0	ND	ND	ND
Phenanthrene	8270	2.0	ND	ND	ND
Pyrene	8270	2.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	2.0	ND	ND	ND
Benzo(a)anthracene	8270	3.0	ND	ND	ND
Benzo(a)pyrene	8270	3.0	ND	ND	ND
Benzo(b)fluoranthene	8270	3.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	3.0	ND	ND	ND
Benzo(k)fluoranthene	8270	3.0	ND	ND	ND
Benzidine	8270	4.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	4.0	ND	ND	ND
N-Nitrosodimethylamine	8270	4.0	ND	ND	ND
Acenaphthene	8270	2.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	3.0	ND	ND	ND
4-Chloroaniline	8270	2.0	ND	ND	ND
2-Methylnaphthalene	8270	2.0	ND	ND	ND
2-Nitroaniline	8270	5.0	ND	ND	ND
4-Nitroaniline	8270	5.0	ND	ND	ND
Dibenzofuran	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	2.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	2.0	ND	ND	ND
2-Chlorophenol	8270	2.0	ND	ND	ND
2,4-Dichlorophenol	8270	2.0	ND	ND	ND
2,4-Dimethylphenol	8270	2.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	5.0	ND	ND	ND
2,4-Dinitrophenol	8270	5.0	ND	ND	ND
2-Nitrophenol	8270	5.0	ND	ND	ND
4-Nitrophenol	8270	5.0	ND	ND	ND
p-Chloro-m-cresol	8270	2.0	ND	ND	ND
Pentachlorophenol	8270	5.0	ND	ND	ND
p-Cresol	8270	2.0	ND	ND	ND
o-Cresol	8270	2.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	2.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.10	ND	ND	ND
Bolstar (Sulprofos)	8140	0.07	ND	ND	ND
Coumaphos	8140	0.20	ND	ND	ND
Demeton, -O, -S	8140	0.12	ND	ND	ND
Diazinon	8140	0.20	ND	ND	ND
Dichlorvos	8140	0.80	ND	ND	ND
Dimethoate	8140	0.26	ND	ND	ND
Disulfoton	8140	0.07	ND	ND	ND
EPN	8140	0.04	ND	ND	ND
Ethoprop	8140	0.20	ND	ND	ND
Fensulfothion	8140	0.08	ND	ND	ND
Fenthion	8140	0.08	ND	ND	ND
Malathion	8140	0.11	ND	ND	ND
Merphos	8140	0.20	ND	ND	ND
Mevinphos	8140	0.50	ND	ND	ND
Naled	8140	0.50	ND	ND	ND
Parathion	8140	0.12	ND	ND	ND
Phorate	8140	0.04	ND	ND	ND
Ronnel	8140	0.07	ND	ND	ND
Sulfotep	8140	0.07	ND	ND	ND
TEPP	8140	0.80	ND	ND	ND
Tetrachlorovinphos	8140	0.80	ND	ND	ND
Tokuthion	8140	0.07	ND	ND	ND
Trichloronate	8140	0.80	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-2C. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8051?	1.5	ND	ND	ND
2,4,5-TP	8051?	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY GROUNDWATER (WELL NO. CC-27B), WEST BRANCH OF CANAL CREEK SURFACE WATER, AND APG-EA TAP WATER (TEST NO. 3) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Alkalinity ($CaCO_3$)	310.1	1.0	0?	38.0	90.4
Ammonia Nitrogen (N)	350.3	0.01	0.011	0.095	0.01
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	147	62.4	16.6
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.264	0.102	0.349
Hardness ($CaCO_3$)	AA	_	58.0	72.6	53.5
pH (electrometric)	150.1	0.01	4.20	6.59	8.12
Nitrate (N)	ISE	0.01	1.76	1.37	5.64
Nitrite (N)	354.1	0.001	<0.001	0.011	<0.001
Phosphate (P)	365.3	0.1	0.932	0.252	0.260
Specific Conductance @ 25 °C	120.1	1.0	423	324	274
Sulfate (SO_4)	375.3	1.0	99.5	46.8	29.6
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	6.5	<2.0
Total Suspended Solids	160.2	1.0	<1.0	22.1	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-3A. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Aluminum (Al)	200.7	10	1660	622	63.0
Antimony (Sb)	204.2	14.5	<14.5		<14.5
	200.7	14.5		<14.5	
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	1.5	<0.5	<0.5
Boron	200.7	50	57.2	57.1	<50
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	32.6	15700	16400	14400
Chromium (Cr)	200.7	6	<6	<6	<6
Cobalt	200.7	1.3	41.7	3.8	<1.3
Copper (Cu)	200.7	2.5	10.2	4.7	23.6
Iron	200.7	2.5	19.7	1440	38.4
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29	5360	9030	5000
Manganese (Mn)	200.7	0.97	639	212	1.4
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	30	52.8	116	89.9
Nickel (Ni)	200.7	2.9	22.2	10.0	3.9
Potassium (K)	200.7	50	2140	3280	2270
Selenium (Se)	200.7	11.1		<11.1	
	270.2	11.1	<11.1		<11.1
Silver (Ag)	200.7	9	46.8	<9	<9
Sodium (Na)	200.7	50	56900	35000	41800
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	57.5	69.9	45.7

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	68.4	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	32.8	4.1	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	55.9	4.4	2.9
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	2.1	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
cis-1,2-Dichloroethene	8021	0.5	2.4	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	53.8	ND	ND
Tetrachloroethene	8021	0.5	5.2	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	85.0	ND	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3A. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
Herbicides:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3B. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH APG-EA TAP WATER (TEST NO. 3) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	69	90	94.4
Ammonia Nitrogen (N)	350.3	0.01	0.046	0.047	0.045
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	28.8	18.0	16.8
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.293	0.313	0.318
Hardness ($CaCO_3$)	AA	_	54.4	52.4	52.9
pH (electrometric)	150.1	0.01	6.97	7.52	7.88
Nitrate (N)	ISE	0.01	4.90	5.76	5.85
Nitrite (N)	354.1	0.001	<0.001	<0.001	<0.001
Phosphate (P)	365.3	0.1	0.406	0.368	0.251
Specific Conductance @ 25 °C	120.1	1.0	309	299	291
Sulfate (SO_4)	375.3	1.0	46.2	30.2	25.6
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	2.4	2.8	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as µmhos/cm and standard units, respectively.

TABLE A58-3B. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	100?	410		
		10		160	95.3
Antimony (Sb)	204.2	14.5	<14.5	<14.5	<14.5
Arsenic (As)	200.7	45	<45	<45	<45
Beryllium (Be)	200.7	0.5	0.6	<0.5	<0.5
Boron	200.7	50	<50	<50	<50
Cadmium (Cd)	200.7	1.5	<1.5	<1.5	<1.5
Calcium (Ca)	200.7	32.6	14600	14000	14100
Chromium (Cr)	200.7	6	<6	<6	<6
Cobalt	200.7	1.3	10.5	<1.3	<1.3
Copper (Cu)	200.7	2.5	23.4	20.2	19.0
Iron	200.7	2.5	26.3	18.5	18.2
Lead (Pb)	200.7	14.5	<14.5	<14.5	<14.5
Magnesium (Mg)	200.7	29	5120	4980	5030
Manganese (Mn)	200.7	0.97	157	30.9	7.1
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	30	116	80.2	83.3
Nickel (Ni)	200.7	2.9	10.2	5.9	4.8
Potassium (K)	200.7	50	2260	2230	2340
Selenium (Se)	270.2	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	9	9.6	<9	<9
Sodium (Na)	200.7	50	48000	44600	45600
Thallium	200.7	75	<75	<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	48.2	48.3	46.6

[a] All results expressed as $\mu g/L$.

TABLE A58-3B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	12.7	1.0	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	4.3	ND	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	10.9	3.8	2.0
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-3B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	12.9	2.5	ND
Tetrachloroethene	8021	0.5	ND	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	12.7	2.4	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3B. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-3B. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A56-3B. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
Herbicides:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH WEST BRANCH OF CANAL CREEK WATER (TEST NO. 3) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	27.6	35.6	35.8
Ammonia Nitrogen (N)	350.3	0.01	0.103	0.086	0.087
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	64.8	64.0	63.2
Cyanide (Cn)	335.2	0.002	<0.002	<0.002	<0.002
Fluoride (F)	340.2	0.01	0.114	0.129	0.113
Hardness ($CaCO_3$)	AA	_	67.2	70.5	70.5
pH (electrometric)	150.1	0.01	6.48	6.73	6.81
Nitrate (N)	ISE	0.01	1.43	1.39	1.43
Nitrite (N)	354.1	0.001	0.002	0.004	0.008
Phosphate (P)	365.3	0.1	0.304	0.824	0.592
Specific Conductance @ 25 °C	120.1	1.0	348	320	310
Sulfate (SO_4)	375.3	1.0	32.8	44.4	44.0
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	15.2	17.4	20.1

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as µmhos/cm and standard units, respectively.

TABLE A58-3C. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	10	1030	889	711
Antimony (Sb)	204.2	14.5	<14.5	<14.5	<14.5
Arsenic (As)	206.2	45	<45		
	200.7	45		<45	
	200.2	45			<45
Beryllium (Be)	200.7	0.5	0.7	<0.5	<0.5
Boron	200.7	50	<50	<50	<50
Cadmium (Cd)	213.1	1.5	<1.5		
	200.7	1.5		<1.5	<1.5
Calcium (Ca)	200.7	32.6	15900	16100	16000
Chromium (Cr)	218.1	1	<1		
	200.7	6		<6	<6
Cobalt	200.7	1.3	13.4	5.9	4.2
Copper (Cu)	200.7	2.5	7.8	7.3	6.6
Iron	200.7	2.5	1240	1520	1490
Lead (Pb)	239.2	14.5	<14.5		
	200.7	14.5		<14.5	<14.5
Magnesium (Mg)	200.7	29	7830	8640	8700
Manganese (Mn)	200.7	0.97	350	238	220
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	246.1	30	109		
	200.7	30		108	102
Nickel (Ni)	200.7	2.9	16	9	10.8
Potassium (K)	200.7	50	3130	3250	3290
Selenium (Se)	270.2	11.1	<11.1	<11.1	<11.1
Silver (Ag)	200.7	9	<9	<9	<9

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - METALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Sodium (Na)	200.7	50	41800	37300	35900
Thallium	279.2	75	<75		
	200.7	75		<75	<75
Tin (Sn)	200.7	9.7	<9.7	<9.7	<9.7
Zinc (Zn)	200.7	1.5	80.5	68.3	72.6

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	15.4	3.8	1.1
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	8.8	4.8	3.9
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	14.8	6.1	4.5
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	17.8	7.9	5.9
Tetrachloroethene	8021	0.5	1.3	0.9	0.8
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	15.9	3.6	1.1
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-3C. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-3C. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY GROUNDWATER (WELL NO. CC-27B), WEST BRANCH OF CANAL CREEK SURFACE WATER, AND APG-EA TAP WATER (TEST NO. 4) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Alkalinity ($CaCO_3$)	310.1	1.0	0?	58.6	31.0
Ammonia Nitrogen (N)	350.3	0.01	0.014	0.203	0.071
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	74	165	27.0
Cyanide (Cn)	335.2	0.002	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.241	0.127	0.778
Hardness ($CaCO_3$)	AA	—	61.2	111	62.6
pH (electrometric)	150.1	0.01	3.62	6.12	7.15
Nitrate (N)	ISE	0.01	1.59	0.696	2.64
Nitrite (N)	354.1	0.001	<0.002	0.025	0.006
Phosphate (P)	365.3	0.1	1.32	0.148	0.312
Specific Conductance @ 25 °C	120.1	1.0	441	660	216
Sulfate (SO_4)	375.3	1.0	92.0	63.2	36.0
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	5.5	<2.0
Total Suspended Solids	160.2	1.0	<1.0	16.5	1.1

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-4A. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Aluminum (Al)	200.7	10	1790	455	80.4
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	200.7	3.2	<3.2	<3.2	<3.2
Beryllium (Be)	200.7	1	1	<1	<1
Boron	200.7	50	55.4	132	91
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	16400	22700	17600
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	43.8	<10	<10
Copper (Cu)	200.7	10	10.6	<10	<10
Iron	200.7	10	17.7	1940	48.6
Lead (Pb)	200.7	50	<50	<50	<50
Magnesium (Mg)	200.7	29	5760	15400	5320
Manganese (Mn)	200.7	1	670	543	2.6
Mercury (Hg)	245.1	0.2	<0.2	<0.2	<0.2
Molybdenum (Mo)	200.7	30	<30	<30	<30
Nickel (Ni)	200.7	5	26.7	10.2	<5
Potassium (K)	200.7	50	2330	4570	2100
Selenium (Se)	270.2	11.1	<50		
		50		<50	<50
Silver (Ag)	200.7	0.4	<0.4	<0.4	<0.4
Sodium (Na)	200.7	50	58400	93200	19500
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	9.7	<10		
		10		<10	<10
Zinc (Zn)	200.7	10	68.6	78.8	193

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	113.4	55.0	3.7
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	41.2	37.0	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	62.4	16.0	1.9
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	3.6	0.7	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
cis-1,2-Dichloroethene	8021	0.5	2.9	1.7	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	72.5	9.5	ND
Tetrachloroethene	8021	0.5	5.7	6.5	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	0.7	ND	ND
Trichloroethene	8021	0.5	98.8	4.1	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4A. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as µg/L.

TABLE A58-4A. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-4A. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
Herbicides:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH APG-EA TAP WATER (TEST NO. 4) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	22.6	29.0	30.6
Ammonia Nitrogen (N)	350.3	0.01	0.069	0.047	0.050
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	39.0	28.0	28.0
Cyanide (Cn)	335.2	0.002	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.621	0.723	0.785
Hardness ($CaCO_3$)	AA	—	62.9	62.0	62.8
pH (electrometric)	150.1	0.01	5.62	6.98	7.12
Nitrate (N)	ISE	0.01	2.50	2.70	2.73
Nitrite (N)	354.1	0.001	<0.002	0.002	0.019
Phosphate (P)	365.3	0.1	0.436	0.279	0.304
Specific Conductance @ 25 °C	120.1	1.0	272	222	214
Sulfate (SO_4)	375.3	1.0	51.2	36.8	38.0
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	1.2	2.7	10.6?

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-4B. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	10	489	148	84.2
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	200.7	3.2	<3.2	<3.2	<3.2
Beryllium (Be)	200.7	1	<1	<1	<1
Boron	200.7	50	148	67.9	<50
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	17600	17400	17700
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	<10	<10	<10
Copper (Cu)	200.7	10	<10	<10	42.7
Iron	200.7	10	11.1	38.4	26.2
Lead (Pb)	200.7	50	<50	<50	
		14.5			<50
Magnesium (Mg)	200.7	29	5400	5290	5290
Manganese (Mn)	200.7	1	172	34.2	8.6
Mercury (Hg)	245.1	0.2	<0.2	<0.2	<0.2
Molybdenum (Mo)	200.7	30	<30	<30	<30
Nickel (Ni)	200.7	5	8.9	9.7	78.0?
Potassium (K)	200.7	50	2080	2020	2080
Selenium (Se)	270.2	50	<50	<50	
	200.7	50			<50
Silver (Ag)	200.7	0.4	<0.4	<0.4	<0.4
Sodium (Na)	200.7	50	29300	20700	20200
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	9.7	<10		<100?
		10		<10	
Zinc (Zn)	200.7	10	156	178	181

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	19.7	5.7	2.9
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	7.8	2.4	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	10.7	3.0	1.5
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	17.2	3.9	ND
Tetrachloroethene	8021	0.5	ND	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	14.7	2.6	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4B. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA FORMERLY DILUTED WITH WEST BRANCH OF CANAL CREEK WATER (TEST NO. 4)[a] - GENERAL WATER QUALITY[b]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	22.4	29.0	30.4
Ammonia Nitrogen (N)	350.3	0.01	0.080	0.044	0.060
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	39	28	28
Cyanide (Cn)	335.2	0.002	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.614	0.738	0.779
Hardness ($CaCO_3$)	AA	—	60.5	60.7	61.7
pH (electrometric)	150.1	0.01	6.40	6.94	6.55
Nitrate (N)	ISE	0.01	2.48	2.72	2.75
Nitrite (N)	354.1	0.001	<0.002	<0.002	<0.002
Phosphate (P)	365.3	0.1	0.206	0.247	0.279
Specific Conductance @ 25 °C	120.1	1.0	271	227	226
Sulfate (SO_4)	375.3	1.0	53.2	37.6	35.2
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	2.2
Total Suspended Solids	160.2	1.0	<1.0	<1.0	1.1

[a] The aquaria in this series were diluted with West Branch of Canal Creek water from the beginning of the study to February 5, 1995. APG-EA dechlorinated tap water was used from February 5, 1995 through the end of the study. See Section 4.6 for further explanation.

[b] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-4C. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	10	482	92.4	125
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	200.7	3.2	<3.2	<3.2	<3.2
Beryllium (Be)	200.7	1	<1	<1	<1
Boron	200.7	50	68.5	<50	79
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	17000	17200	17600
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	14.3	<10	<10
Copper (Cu)	200.7	10	<10	<10	<10
Iron	200.7	10	12.9	21.6	41.3
Lead (Pb)	200.7	50	<50	<50	<50
Magnesium (Mg)	200.7	29	5130	5070	5050
Manganese (Mn)	200.7	1	168	35.4	14.5
Mercury (Hg)	245.1	0.2	<0.2	<0.2	<0.2
Molybdenum (Mo)	200.7	30	<30	<30	<30
Nickel (Ni)	200.7	5	11.1	5.2	6.5
Potassium (K)	200.7	50	2110	1890	2010
Selenium (Se)	270.2	50	<50	<50	<50
Silver (Ag)	200.7	0.4	<0.4	<0.4	<0.4
Sodium (Na)	200.7	50	28700	20600	20100
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	10	<10	<10	<10
Zinc (Zn)	200.7	10	149	164	191

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	22.5	6.8	3.5
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	8.6	3.6	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	12.5	3.8	2.0
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	18.2	4.4	0.8
Tetrachloroethene	8021	0.5	0.7	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	16.7	4.0	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-4C. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-5A. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY GROUNDWATER (WELL NO. CC-27B), WEST BRANCH OF CANAL CREEK SURFACE WATER, AND APG-EA TAP WATER (TEST NO. 5) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Alkalinity ($CaCO_3$)	310.1	1.0	4.0	92	80
Ammonia Nitrogen (N)	350.3	0.01	0.049	0.078	0.067
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	83.5	882	26.4
Cyanide (Cn)	335.2	0.006	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.260	0.107	0.797
Hardness ($CaCO_3$)	AA	_	66.4	282	52.9
pH (electrometric)	150.1	0.01	4.30	7.72	7.00
Nitrate (N)	ISE	0.01	2.87	1.28	2.32
Nitrite (N)	354.1	0.001	<0.002	0.025	0.008
Phosphate (P)	365.3	0.1	1.11	0.122	1.08
Specific Conductance @ 25 °C	120.1	1.0	439	2005	218
Sulfate (SO_4)	375.3	1.0	119	139	25
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	3.8	<2.0
Total Suspended Solids	160.2	1.0	3.5	20.1	<1.0

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-5A. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Aluminum (Al)	200.7	10	1850	759	102
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	206.2	5	<5	<5	<5
Beryllium (Be)	200.7	0.5	1.8	<0.5	<0.5
Boron	200.7	50	296	402	214
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	17600	31300	14300
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	46.1	<10	<10
Copper (Cu)	200.7	10	12.3	<10	<10
Iron	200.7	10	<10	1140	<10
Lead (Pb)	200.7	50	<50	<50	<50
Magnesium (Mg)	200.7	29	6390	58300	4900
Manganese (Mn)	200.7	5	693	119	<5
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	30	<30	34.7	<30
Nickel (Ni)	200.7	5	24.8	<5	<5
Potassium (K)	200.7	50	2750	21700	2090
Selenium (Se)	270.2	50	<50	<50	<50
Silver (Ag)	272.2	0.5	<0.5	<0.5	<0.5
Sodium (Na)	200.7	50	62600	452000	23600
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	10	<10	<10	<10
Zinc (Zn)	200.7	10	76.2	119	253

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	4.6	ND	ND
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	43.9	1.9	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	63.4	ND	9.9
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
cis-1,2-Dichloroethene	8021	0.5	3.3	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	75.9	ND	ND
Tetrachloroethene	8021	0.5	6.7	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	4.6	ND	ND
1,1,2-Trichloroethane	8021	0.5	0.7	ND	ND
Trichloroethene	8021	0.5	102.0	ND	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C.	100% APG-EA
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5A. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	100% G.W.	100% W.B.C.C	100% APG-EA
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA DILUTED WITH APG-EA TAP WATER (TEST NO. 5) - GENERAL WATER QUALITY[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	60	96	80
Ammonia Nitrogen (N)	350.3	0.01	0.092	0.065	0.067
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	39.0	29.0	27.2
Cyanide (Cn)	335.2	0.006	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.585	0.725	0.757
Hardness ($CaCO_3$)	AA	_	58.1	54.2	55.8
pH (electrometric)	150.1	0.01	6.68	7.25	7.44
Nitrate (N)	ISE	0.01	2.14	2.23	2.23
Nitrite (N)	354.1	0.001	<0.002	0.002	0.008
Phosphate (P)	365.3	0.1	1.05	0.408	0.424
Specific Conductance @ 25 °C	120.1	1.0	272	216	216
Sulfate (SO_4)	375.3	1.0	61.8	35.2	31.2
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	<1.0	<1.0	1.5

[a] All results expressed as mg/L except for specific conductance and pH which are expressed as µmhos/cm and standard units, respectively.

TABLE A58-5B. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	10	630	218	102
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	206.2	5	<5	<5	<5
Beryllium (Be)	200.7	0.5	1	<0.5	<0.5
Boron	200.7	50	242	229	171
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	15400	14500	15000
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	11	<10	<10
Copper (Cu)	200.7	10	<10	<10	<10
Iron	200.7	10	<10	<10	<10
Lead (Pb)	200.7	50	<50	<50	<50
Magnesium (Mg)	200.7	29	5610	5120	5220
Manganese (Mn)	200.7	0.97	167		5.6
		5		29.5	
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	30	<30	<30	<30
Nickel (Ni)	200.7	5	7.2	5.5	5.7
Potassium (K)	200.7	50	2460	2070	2240
Selenium (Se)	270.2	50	<50	<50	<50
Silver (Ag)	272.2	0.5	<0.5	<0.5	<0.5
Sodium (Na)	200.7	50	34300	25100	25100
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	10	<10		<10
		0.97		<10	
Zinc (Zn)	200.7	5	190		248
		1.5		224	

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	8.3	2.6	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	17.7	11.4	9.3
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	18.4	4.3	0.8
Tetrachloroethene	8021	0.5	ND	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	ND	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	17.3	3.2	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	ND	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND
Hexachloroethane	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5B. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-5B. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
<u>Pesticides</u>:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
<u>Herbicides</u>:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-5C. COMPREHENSIVE CHEMICAL ANALYSIS OF THE WEST BRANCH OF CANAL CREEK STUDY CHRONIC HISTOPATHOLOGY GROUNDWATER EXPOSURE AQUARIA FROMERLY DILUTED WITH WEST BRANCH CANAL OF CREEK WATER (TEST NO. 5)[a] - GENERAL WATER QUALITY[b]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Alkalinity ($CaCO_3$)	310.1	1.0	64	76	84
Ammonia Nitrogen (N)	350.3	0.01	0.118	0.101	0.097
Bromide	320.1	0.2	<0.2	<0.2	<0.2
Chloride (Cl)	325.3	1.0	43.5	29.0	26.0
Cyanide (Cn)	335.2	0.006	<0.006	<0.006	<0.006
Fluoride (F)	340.2	0.01	0.584	0.748	0.732
Hardness ($CaCO_3$)	AA	_	57.3	55.1	55.4
pH (electrometric)	150.1	0.01	6.72	7.24	7.45
Nitrate (N)	ISE	0.01	2.55	2.21	2.34
Nitrite (N)	354.1	0.001	0.002	0.004	0.007
Phosphate (P)	365.3	0.1	0.628	0.367	0.799
Specific Conductance @ 25 °C	120.1	1.0	274	233	214
Sulfate (SO_4)	375.3	1.0	56.4	35.8	12
Sulfide (H_2S)	9030	0.002	<0.002	<0.002	<0.002
Total Organic Carbon	415.1	2.0	<2.0	<2.0	<2.0
Total Suspended Solids	160.2	1.0	1.5	<1.0	2.5

[a] The aquaria in this series were diluted with West Branch of Canal Creek water from the beginning of the study to February 5, 1995. APG-EA dechlorinated tap water was used from February 5, 1995 through the end of the study. See Section 4.6 for further explanation.

[b] All results expressed as mg/L except for specific conductance and pH which are expressed as μmhos/cm and standard units, respectively.

TABLE A58-5C. (CONTINUED) - METALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Aluminum (Al)	200.7	10	574	247	140
Antimony (Sb)	204.2	50	<50	<50	<50
Arsenic (As)	206.2	5	<5	<5	<5
Beryllium (Be)	200.7	0.5	0.9	0.7	0.7
Boron	200.7	50	269	441	184
Cadmium (Cd)	200.7	5	<5	<5	<5
Calcium (Ca)	200.7	32.6	15200	14600	14700
Chromium (Cr)	200.7	10	<10	<10	<10
Cobalt	200.7	10	10.3	<10	<10
Copper (Cu)	200.7	10	<10	<10	<10
Iron	200.7	10	<10	<10	<10
Lead (Pb)	200.7	50	<50	<50	<50
Magnesium (Mg)	200.7	29	5510	5320	5320
Manganese (Mn)	200.7	1	162		
		5		23.5	<5
Mercury (Hg)	245.1	0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	200.7	30	<30	<30	<30
Nickel (Ni)	200.7	5	8.4	<5	<5
Potassium (K)	200.7	50	2450	2460	2400
Selenium (Se)	270.2	50	<50	<50	<50
Silver (Ag)	272.2	0.5	<0.5	<0.5	
	270.2				<0.5
Sodium (Na)	200.7	50	33100	26200	24800
Thallium	200.7	50	<50	<50	<50
Tin (Sn)	200.7	10	<10	<10	<10
Zinc (Zn)	200.7	10	177	207	210

[a] All results expressed as $\mu g/L$.

TABLE A58-5C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Benzene	8021	0.5	ND	ND	ND
Bromobenzene	8021	0.5	ND	ND	ND
Bromochloromethane	8021	0.5	ND	ND	ND
Bromodichloromethane	8021	0.5	ND	ND	ND
Bromoform	8021	0.5	ND	ND	ND
Bromomethane	8021	0.5	ND	ND	ND
n-Butylbenzene	8021	0.5	ND	ND	ND
s-Butylbenzene	8021	0.5	ND	ND	ND
t-Butylbenzene	8021	0.5	ND	ND	ND
Carbon Tetrachloride	8021	0.5	8.8	4.2	ND
Chlorobenzene	8021	0.5	ND	ND	ND
Chlorodibromomethane	8021	0.5	ND	ND	ND
Chloroethane	8021	0.5	ND	ND	ND
Chloroform	8021	0.5	19.8	13.3	10.1
Chloromethane	8021	0.5	ND	ND	ND
2-Chlorotoluene	8021	0.5	ND	ND	ND
4-Chlorotoluene	8021	0.5	ND	ND	ND
1,2-Dibromo-3-chloropropane	8021	0.5	ND	ND	ND
1,2-Dibromoethane	8021	0.5	ND	ND	ND
Dibromomethane	8021	0.5	ND	ND	ND
1,2-Dichlorobenzene	8021	0.5	ND	ND	ND
1,3-Dichlorobenzene	8021	0.5	ND	ND	ND
1,4-Dichlorobenzene	8021	0.5	ND	ND	ND
Dichlorodifluoromethane	8021	1.0	ND	ND	ND
1,1-Dichloroethane	8021	0.5	ND	ND	ND
1,2-Dichloroethane	8021	0.5	ND	ND	ND
1,1-Dichloroethene	8021	0.5	ND	ND	ND

[a] All results expressed as μg/L.

TABLE A58-5C. (CONTINUED) - PRIORITY POLLUTANT VOLATILE ORGANICS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
cis-1,2-Dichloroethene	8021	0.5	ND	ND	ND
1,1-Dichloropropene	8021	0.5	ND	ND	ND
cis-1,3-Dichloropropene	8021	0.5	ND	ND	ND
trans-1,3-Dichloropropene	8021	0.5	ND	ND	ND
Ethylbenzene	8021	0.5	ND	ND	ND
Hexachlorobutadiene	8021	0.5	ND	ND	ND
Isopropylbenzene	8021	0.5	ND	ND	ND
p-Isopropyltoluene	8021	0.5	ND	ND	ND
Methylene chloride	8021	0.5	ND	ND	ND
Naphthalene	8021	0.5	ND	ND	ND
n-Propylbenzene	8021	0.5	ND	ND	ND
Styrene	8021	0.5	ND	ND	ND
1,1,1,2-Tetrachloroethane	8021	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	8021	0.5	19.3	5.5	ND
Tetrachloroethene	8021	0.5	ND	ND	ND
Toluene	8021	0.5	ND	ND	ND
1,2,3-Trichlorobenzene	8021	0.5	ND	ND	ND
1,2,4-Trichlorobenzene	8021	0.5	ND	ND	ND
1,1,1-Trichloroethane	8021	0.5	0.7	ND	ND
1,1,2-Trichloroethane	8021	0.5	ND	ND	ND
Trichloroethene	8021	0.5	19.7	4.7	ND
Trichlorofluoromethane	8021	0.5	ND	ND	ND
1,2,3-Trichloropropane	8021	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	8021	0.5	ND	ND	ND
1,3,5-Trimethylbenzene	8021	0.5	ND	ND	ND
Vinyl Chloride	8021	0.5	ND	ND	ND
o,m,p-Xylenes	8021	0.5	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Bis-(2-chloroethoxy) Methane	8270	10.0	ND	ND	ND
Bis-(2-chloroethyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-chloroisopropyl) Ether	8270	10.0	ND	ND	ND
Bis-(2-ethylhexyl) Phthalate	8270	10.0	ND	20.4[b]	ND
4-Bromophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Butyl Benzyl Phthalate	8270	10.0	ND	ND	ND
2-Chloronapthalene	8270	10.0	ND	ND	ND
4-Chlorophenyl Phenyl Ether	8270	10.0	ND	ND	ND
Chrysene	8270	10.0	ND	ND	ND
Dibenzo (a,h) Anthracene	8270	10.0	ND	ND	ND
Acenaphthylene	8270	10.0	ND	ND	ND
1,2-Dichlorobenzene	8270	10.0	ND	ND	ND
1,3-Dichlorobenzene	8270	10.0	ND	ND	ND
1,4-Dichlorobenzene	8270	10.0	ND	ND	ND
3,3'-Dichlorobenzidine	8270	20.0	ND	ND	ND
Diethyl Phthalate	8270	10.0	ND	ND	ND
Dimethyl Phthalate	8270	10.0	ND	ND	ND
Di-n-Butyl Phthalate	8270	10.0	ND	ND	ND
2,4-Dinitrotoluene	8270	10.0	ND	ND	ND
2,6-Dinitrotoluene	8270	10.0	ND	ND	ND
Di-n-Octyl Phthalate	8270	10.0	ND	ND	ND
Fluoranthene	8270	10.0	ND	ND	ND
Fluorene	8270	10.0	ND	ND	ND
Hexachlorobenzene	8270	10.0	ND	ND	ND
Hexachlorobutadiene	8270	10.0	ND	ND	ND
Hexachlorocyclopentadiene	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.
[b] Value appears to be spurious; compound not reported for any other data sets.

TABLE A58-5C. (CONTINUED) - PRIORITY POLLUTANT BASE NEUTRALS CON'T[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Hexachloroethane	8270	10.0	ND	ND	ND
Indeno[1,2,3-cd]pyrene	8270	10.0	ND	ND	ND
Isophorone	8270	10.0	ND	ND	ND
Naphthalene	8270	10.0	ND	ND	ND
Anthracene	8270	10.0	ND	ND	ND
Nitrobenzene	8270	10.0	ND	ND	ND
N-Nitroso-di-n-propylamine	8270	10.0	ND	ND	ND
N-Nitrosodiphenylamine	8270	10.0	ND	ND	ND
Phenanthrene	8270	10.0	ND	ND	ND
Pyrene	8270	10.0	ND	ND	ND
1,2,4-Trichlorobenzene	8270	10.0	ND	ND	ND
Benzo(a)anthracene	8270	10.0	ND	ND	ND
Benzo(a)pyrene	8270	10.0	ND	ND	ND
Benzo(b)fluoranthene	8270	10.0	ND	ND	ND
Benzo(g,h,i)perylene	8270	10.0	ND	ND	ND
Benzo(k)fluoranthene	8270	10.0	ND	ND	ND
Benzidine	8270	10.0	ND	ND	ND
1,2-Diphenylhydrazine	8270	20.0	ND	ND	ND
N-Nitrosodimethylamine	8270	20.0	ND	ND	ND
Acenaphthene	8270	10.0	ND	ND	ND
3,4-Benzo-fluoranthene	8270	10.0	ND	ND	ND
4-Chloroaniline	8270	20.0	ND	ND	ND
2-Methylnaphthalene	8270	10.0	ND	ND	ND
2-Nitroaniline	8270	50.0	ND	ND	ND
4-Nitroaniline	8270	20.0	ND	ND	ND
Dibenzofuran	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5C. (CONTINUED) - PRIORITY POLLUTANT ACID EXTRACTABLES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Phenol	8270	10.0	ND	ND	ND
2,4,6-Trichlorophenol	8270	10.0	ND	ND	ND
2-Chlorophenol	8270	10.0	ND	ND	ND
2,4-Dichlorophenol	8270	10.0	ND	ND	ND
2,4-Dimethylphenol	8270	10.0	ND	ND	ND
4,6-Dinitro-o-cresol	8270	50.0	ND	ND	ND
2,4-Dinitrophenol	8270	50.0	ND	ND	ND
2-Nitrophenol	8270	10.0	ND	ND	ND
4-Nitrophenol	8270	50.0	ND	ND	ND
p-Chloro-m-cresol	8270	20.0	ND	ND	ND
Pentachlorophenol	8270	50.0	ND	ND	ND
p-Cresol	8270	10.0	ND	ND	ND
o-Cresol	8270	10.0	ND	ND	ND
2,4,5-Trichlorophenol	8270	10.0	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5C. (CONTINUED) - ORGANOPHOSPHORUS PESTICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Azinphos-methyl	8140	0.20	ND	ND	ND
Bolstar (Sulprofos)	8140	0.14	ND	ND	ND
Coumaphos	8140	0.40	ND	ND	ND
Demeton, -O, -S	8140	0.24	ND	ND	ND
Diazinon	8140	0.40	ND	ND	ND
Dichlorvos	8140	1.60	ND	ND	ND
Dimethoate	8140	0.52	ND	ND	ND
Disulfoton	8140	0.14	ND	ND	ND
EPN	8140	0.08	ND	ND	ND
Ethoprop	8140	0.40	ND	ND	ND
Fensulfothion	8140	0.16	ND	ND	ND
Fenthion	8140	0.16	ND	ND	ND
Malathion	8140	0.22	ND	ND	ND
Merphos	8140	0.40	ND	ND	ND
Mevinphos	8140	1.00	ND	ND	ND
Naled	8140	1.00	ND	ND	ND
Parathion	8140	0.24	ND	ND	ND
Phorate	8140	0.08	ND	ND	ND
Ronnel	8140	0.14	ND	ND	ND
Sulfotep	8140	0.14	ND	ND	ND
TEPP	8140	1.60	ND	ND	ND
Tetrachlorovinphos	8140	1.60	ND	ND	ND
Tokuthion	8140	0.14	ND	ND	ND
Trichloronate	8140	1.60	ND	ND	ND

[a] All results expressed as $\mu g/L$.

TABLE A58-5C. (CONTINUED) - CHLORINATED PESTICIDES AND HERBICIDES[a]

Analyte	EPA Method	Detection Limits	25% G.W.	5% G.W.	1% G.W.
Pesticides:					
Aldrin	8080	0.034	ND	ND	ND
Alpha-BHC	8080	0.035	ND	ND	ND
Beta-BHC	8080	0.023	ND	ND	ND
Delta-BHC	8080	0.024	ND	ND	ND
Gamma-BHC (Lindane)	8080	0.025	ND	ND	ND
Chlordane	8080	0.037	ND	ND	ND
4,4'-DDD	8080	0.050	ND	ND	ND
4,4'-DDE	8080	0.058	ND	ND	ND
4,4'-DDT	8080	0.081	ND	ND	ND
Dieldrin	8080	0.044	ND	ND	ND
Alpha-Endosulfan	8080	0.030	ND	ND	ND
Beta-Endosulfan	8080	0.040	ND	ND	ND
Endosulfan sulfate	8080	0.0072	ND	ND	ND
Endrin	8080	0.0072	ND	ND	ND
Endrin Aldehyde	8080	0.0032	ND	ND	ND
Heptachlor	8080	0.0040	ND	ND	ND
Heptachlor Epoxide	8080	0.0042	ND	ND	ND
Methoxychlor	8080	0.0500	ND	ND	ND
Chlorpyrifos	8080	0.0044	ND	ND	ND
Toxaphene	8080	0.0114	ND	ND	ND
Malathion	8080	0.1100	ND	ND	ND
Parathion	8080	0.1200	ND	ND	ND
Dursban	8080	0.0044	ND	ND	ND
Herbicides:					
2,4-D	8150	1.5	ND	ND	ND
2,4,5-TP	8150	0.05	ND	ND	ND

[a] All results expressed as $\mu g/L$.

APPENDIX 59

ROUTINE WATER QUALITY OF THE CHRONIC HISTOPATHOLOGY EXPOSURE TANKS

TANK No. 1
TANK CONCENTRATION: 100% WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.01	6.72							
08-13-94	2	900	25.3	6.93	5.88							
08-14-94	3	900	25.3	7.02	5.59							
08-15-94	4	900	24.2	6.87	5.65							
08-16-94	5	1000	24.1	7.02	6.10							
08-17-94	6	1000	25.1	7.12	5.39							
08-18-94	7	900	24.9	6.87	4.80	47.6	85.5	921	0.00	0.00	0.253	0.00106
08-19-94	8	800	24.4	6.79	5.28							
08-20-94	9	1000	25.1	6.85	5.90							
08-21-94	10	800	25.4	6.88	5.58							
08-22-94	11	900	24.3	6.80	5.34							
08-23-94	12	730	22.9	6.81	6.29							
08-24-94	13	1000	23.9	6.69	6.46							
08-25-94	14	1100	23.7	6.82	6.25	54.4	119.7	734	0.00	0.00	0.108	0.00037
08-26-94	15	900	24.1	6.77	5.73							
08-27-94	16	900	24.0	6.82	5.47							
08-28-94	17	800	24.5	6.93	5.57							
08-29-94	18	900	25.3	6.89	4.84							
08-30-94	19	900	22.8	6.76	5.29							
08-31-94	20	800	24.3	7.07	6.41							
09-01-94	21	1100	24.6	6.91	6.14	68.0	136.8	548	0.00	0.00	a	a
09-02-94	22	900	23.7	6.78	5.59							
09-03-94	23	815	24.5	6.99	6.10							
09-04-94	24	810	24.2	6.95	6.18							
09-05-94	25	1100	24.6	6.83	6.44							
09-06-94	26	900	24.5	6.83	6.45							
09-07-94	27	800	24.1	6.86	6.63							
09-08-94	28	1100	24.0	6.90	6.32	81.6	136.8	603	0.00	0.00	0.044	0.00018
09-09-94	29	900	23.9	6.91	6.79							
09-10-94	30	900	24.3	6.89	6.21							
09-11-94	31	800	23.1	6.90	6.13							
09-12-94	32	500	23.9	7.09	6.47							

09-13-94	33	700	24.1	7.00	6.69							
09-14-94	34	1400	26.5	7.02	4.28							
09-15-94	35	1300	26.2	7.13	5.00							
09-16-94	36	1200	25.6	6.72	5.08	40.8	171.0	867	0.00	0.00	0.067	0.00021
09-17-94	37	820	25.4	6.81	5.39							
09-18-94	38	830	25.5	6.83	4.80							
09-19-94	39	1000	24.5	6.97	5.40							
09-20-94	40	1000	23.9	6.92	5.39							
09-21-94	41	1000	25.4	6.95	5.35							
09-22-94	42	900	24.4	6.91	5.70	74.8	136.8	711	0.00	0.00	a	a
09-23-94	43	1000	24.2	6.80	6.38							
09-24-94	44	845	24.0	6.72	6.00							
09-25-94	45	1300	25.3	a	5.80							
09-26-94	46	900	26.2	6.80	4.00							
09-27-94	47	800	25.1	6.72	5.36							
09-28-94	48	1000	24.4	6.76	5.38	47.6	136.8	924	a	a	a	a
09-29-94	49	1030	26.2	6.85	2.75							
09-30-94	50	1030	22.8	6.86	6.88							
10-01-94	51	900	23.4	7.01	6.52							
10-02-94	52	915	23.4	6.87	6.09							
10-03-94	53	1100	22.3	6.87	6.34							
10-04-94	54	1100	22.9	6.87	6.63							
10-05-94	55	1000	24.0	6.90	6.50							
10-06-94	56	800	22.9	6.96	6.88	74.8	153.9	785	0.00	0.00	a	a
10-07-94	57	1100	23.8	6.95	7.44						0.038	0.00018
10-08-94	58	1100	24.4	6.96	7.31							
10-09-94	59	1100	26.8	6.85	5.65							
10-10-94	60	1000	24.6	6.85	5.48							
10-11-94	61	1600	25.2	6.98	3.90							
10-12-94	62	900	22.0	6.94	7.61							
10-13-94	63	1300	24.0	6.84	7.20	54.4	307.8	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.79	6.34							
10-15-94	65	900	24.1	6.90	6.69							
10-16-94	66	900	23.7	6.70	7.46							
10-17-94	67	1000	23.2	6.84	7.35							
10-18-94	68	800	23.7	6.63	6.99							
10-19-94	69	900	24.4	6.74	7.39							
10-20-94	70	900	23.5	6.69	6.28	40.8	564.3	>1999	0.00	0.00	0.016	0.00004
10-21-94	71	900	21.4	6.77	6.98							
10-22-94	72	800	22.1	6.80	6.76							
10-23-94	73	900	23.1	6.76	6.89							
10-24-94	74	900	21.6	6.71	6.18							
10-25-94	75	900	22.2	6.70	6.44							
10-26-94	76	800	21.1	6.80	7.04							

10-27-94	77	1100	20.8	6.80	7.63	61.2	171.0	850	0.00	0.00	0.110	0.00029
10-28-94	78	1000	20.3	6.85	7.95							
10-29-94	79	900	20.6	6.90	7.97							
10-30-94	80	900	21.0	6.85	7.84							
10-31-94	81	1000	21.7	6.80	7.42							
11-01-94	82	1100	25.4	6.78	5.28							
11-02-94	83	1000	21.8	6.77	7.04							
11-03-94	84	1000	21.1	6.77	6.83							
11-04-94	85	1000	21.9	6.83	6.55	68.0	188.1	977	0.00	0.00	0.140	0.00043
11-05-94	86	1000	22.6	6.85	7.53							
11-06-94	87	1000	24.4	6.81	6.62							
11-07-94	88	700	21.9	6.79	7.39							
11-08-94	89	1000	20.5	6.85	8.22							
11-09-94	90	1000	22.0	6.74	7.47							
11-10-94	91	1100	22.1	6.87	6.86							
11-11-94	92	900	19.3	6.81	7.77	61.2	205.2	908	0.00	0.00	0.065	0.00016
11-12-94	93	845	18.2	6.74	8.27							
11-13-94	94	830	20.8	6.80	8.18							
11-14-94	95	1000	21.4	6.73	7.40							
11-15-94	96	900	22.0	6.74	7.22							
11-16-94	97	900	21.7	6.79	6.79	61.2	153.9	1145	0.00	0.00	0.056	0.00015
11-17-94	98	900	21.2	6.85	7.32							
11-18-94	99	900	24.4	6.73	7.23							
11-19-94	100	800	23.0	6.72	6.72							
11-20-94	101	900	22.8	6.78	7.02							
11-21-94	102	600	22.2	6.78	7.28							
11-22-94	103	600	23.7	6.83	7.10							
11-23-94	104	800	18.8	6.79	8.56	54.4	136.8	>1999	0.00	0.00	0.058	0.00013
11-24-94	105	730	22.8	6.78	8.66							
11-25-94	106	1020	22.4	7.08	9.78							
11-26-94	107	1000	20.0	6.77	10.53							
11-27-94	108	900	19.7	6.69	9.33							
11-28-94	109	900	21.5	6.75	9.10							
11-29-94	110	900	21.0	6.71	8.70							
11-30-94	111	900	21.0	6.63	8.53							
12-01-94	112	900	20.5	6.62	8.84	47.6	102.6	406	0.00	0.00	0.160	0.00027
12-02-94	113	1000	21.4	6.69	9.45							
12-03-94	114	1000	21.2	6.65	8.69							
12-04-94	115	1100	22.8	6.68	7.91							
12-05-94	116	900	24.9	6.73	7.12							
12-06-94	117	900	23.4	6.84	7.37							
12-07-94	118	800	23.0	6.86	7.95							
12-08-94	119	1100	26.3	6.85	5.72	54.4	119.7	442	0.00	0.00	0.092	0.00040
12-09-94	120	1000	22.5	6.88	7.41							

12-10-94	121	1300	22.6	6.86	8.10							
12-11-94	122	900	31.1	6.78	3.19							
12-12-94	123	900	24.6	7.72	8.35							
12-13-94	124	900	24.5	7.77	8.74							
12-14-94	125	900	24.4	7.78	8.88							
12-15-94	126	800	20.3	6.89	10.05	47.6	495.9	>1999	0.00	0.00	0.100	0.00031
12-16-94	127	1100	21.5	6.80	8.99							
12-17-94	128	845	21.7	6.66	8.91							
12-18-94	129	930	21.8	6.71	8.15							
12-19-94	130	1000	22.0	6.71	8.00							
12-20-94	131	1100	21.7	6.80	8.34							
12-21-94	132	1000	18.3	6.77	9.76	54.4	273.6	1968	0.00	0.00	0.140	0.00029
12-22-94	133	800	27.9	7.05	6.65							
12-23-94	134	1000	28.2	6.86	5.50							
12-24-94	135	900	28.0	7.08	6.86							
12-25-94	136	700	24.8	7.73	8.38							
12-26-94	137	1000	25.3	7.81	8.28							
12-27-94	138	1100	20.5	6.85	8.92							
12-28-94	139	1000	19.9	6.84	9.86							
12-29-94	140	900	19.5	6.73	8.81	54.4	239.4	1146	0.00	0.00	0.095	0.00020
12-30-94	141	1000	27.5	6.87	7.06							
12-31-94	142	1000	28.3	7.00	3.01							
01-01-95	143	1100	20.5	6.84	8.92							
01-02-95	144	1000	20.1	6.85	8.51							
01-03-95	145	1100	21.9	6.86	7.80							
01-04-95	146	900	18.7	6.93	9.56							
01-05-95	147	1100	26.3	7.21	4.87	74.8	102.6	540	0.00	0.00	0.040	0.00040
01-06-95	148	1000	23.3	7.50	8.59							
01-07-95	149	1130	24.2	7.56	9.38							
01-08-95	150	1030	23.8	7.59	8.99							
01-09-95	151	1000	23.8	7.70	9.70							
01-10-95	152	1000	19.9	6.77	9.59							
01-11-95	153	1000	20.1	6.97	8.83							
01-12-95	154	1100	20.5	6.70	8.54	47.6	136.8	425	0.00	0.00	0.036	0.00007
01-13-95	155	1000	20.9	6.70	8.28							
01-14-95	156	900	22.1	6.71	7.41							
01-15-95	157	800	25.2	6.85	6.49							
01-16-95	158	1030	23.7	6.82	6.77							
01-17-95	159	1000	23.2	6.82	8.03							
01-18-95	160	1000	23.4	7.01	7.01							
01-19-95	161	1000	23.0	7.07	7.76	54.4	564.3	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.7	6.93	7.03							
01-21-95	163	1000	23.0	6.81	7.06							
01-22-95	164	1100	21.9	6.93	7.68							

01-23-95	165	600	20.6	6.92	8.91							
01-24-95	166	1000	21.4	6.80	9.35							
01-25-95	167	1100	25.0	6.80	5.76							
01-26-95	168	1000	20.6	6.80	8.26	47.6	102.6	337	0.00	0.00	0.032	0.00008
01-27-95	169	1000	18.6	6.75	9.19							
01-28-95	170	830	19.1	6.68	8.66							
01-29-95	171	900	22.5	6.78	8.37							
01-30-95	172	1000	18.9	6.83	9.35							
01-31-95	173	1000	20.4	7.70	8.65							
02-01-95	174	1000	18.3	6.92	9.68							
02-02-95	175	900	19.4	6.76	8.51	54.4	153.9	644	0.00	0.00	0.900	0.00020
02-03-95	176	930	26.0	6.84	4.17							
02-04-95	177	1000	17.9	6.94	10.47							
02-05-95	178	1200	25.2	6.83	4.18							
02-06-95	179	930	21.5	7.49	8.53							
02-07-95	180	900	22.2	7.55	8.48							
02-08-95	181	900	22.1	7.50	9.12							
02-09-95	182	900	21.3	7.41	9.50	47.6	102.6	250	0.00	0.00	0.032	0.00036
02-10-95	183	900	21.6	7.37	9.06							
02-11-95	184	900	21.0	7.22	9.81							
02-12-95	185	1200	21.0	7.07	9.82							
02-13-95	186	900	20.8	7.25	8.67							
02-14-95	187	900	20.7	7.24	9.36							
02-15-95	188	900	20.8	7.30	9.91							
02-16-95	189	900	20.9	7.18	9.98	40.8	102.6	238	0.00	0.00	0.120	0.00077
02-17-95	190	900	21.8	7.21	9.48							
02-18-95	191	1100	21.9	7.09	10.19							
02-19-95	192	1400	22.3	7.08	9.75							
02-20-95	193	1000	22.2	7.21	9.36							
02-21-95	194	1000	22.3	7.30	9.50							
02-22-95	195	900	22.0	7.30	9.24							
02-23-95	196	1000	23.3	7.29	9.37	34.0	85.5	238	0.00	0.00	0.089	0.00090
02-24-95	197	1000	22.9	7.25	9.17							
02-25-95	198	1000	22.7	7.31	9.30							
02-26-95	199	1800	23.0	7.24	9.46							
02-27-95	200	900	22.9	7.27	9.25							
02-28-95	201	900	23.5	7.28	9.23							
03-01-95	202	900	23.5	7.23	9.19							
03-02-95	203	900	23.3	7.24	9.20	34.0	85.5	343	0.00	0.00	0.110	0.00093
03-03-95	204	900	22.7	7.27	9.27							
03-04-95	205	1000	22.4	7.25	9.27							
03-05-95	206	1015	22.5	7.13	9.32							
03-06-95	207	900	22.5	7.27	9.33							
03-07-95	208	900	22.6	7.22	9.20							

03-08-95	209	900	22.5	7.33	9.00							
03-09-95	210	1000	22.6	7.25	8.84	40.8	85.5	240	0.00	0.00	0.059	0.00049
03-10-95	211	900	24.2	7.20	8.67							
03-11-95	212	1100	23.3	7.22	9.12							
03-12-95	213	1800	24.3	7.19	8.91							
03-13-95	214	900	23.5	7.22	8.83							
03-14-95	215	900	23.6	7.26	9.12							
03-15-95	216	900	23.0	7.27	9.02							
03-16-95	217	900	24.1	7.19	9.09	47.6	85.5	212	0.00	0.00	0.023	0.00018
03-17-95	218	900	24.5	7.28	8.69							
03-18-95	219	1000	24.6	7.26	8.58							
03-19-95	220	1600	25.4	7.26	8.36							
03-20-95	221	900	24.0	7.26	8.80							
03-21-95	222	900	24.6	7.26	8.56							
03-22-95	223	900	24.5	7.23	8.78							
03-23-95	224	1100	24.5	7.21	8.56	47.6	85.5	234	0.00	0.00	a	a
03-24-95	225	900	24.4	7.26	7.81							
03-25-95	226	915	24.4	6.99	8.18							
03-26-95	227	900	24.5	7.00	8.92							
03-27-95	228	900	24.6	7.24	8.36							
03-28-95	229	900	24.4	7.24	8.02							
03-29-95	230	900	24.2	7.23	8.19							
03-30-95	231	900	24.4	7.24	7.89	47.6	85.5	227	0.00	0.00	0.050	0.00040
03-31-95	232	900	24.1	7.26	7.78							
04-01-95	233	900	24.1	7.03	8.14							
04-02-95	234	1000	24.2	6.97	8.52							
04-03-95	235	900	23.8	7.25	8.42							
04-04-95	236	900	24.2	7.29	8.20							
04-05-95	237	900	23.5	7.27	7.86							
04-06-95	238	900	23.8	7.30	8.20	40.8	85.5	223	0.00	0.00	0.049	0.00037
04-07-95	239	900	24.0	7.33	8.00							
04-08-95	240	1100	24.5	7.29	8.30							
04-09-95	241	1300	25.1	7.27	8.66							
04-10-95	242	900	24.4	7.26	7.65							
04-11-95	243	900	24.8	7.27	7.60							
04-12-95	244	900	24.9	7.29	7.41							
04-13-95	245	1100	24.9	7.30	7.55	40.8	85.5	246	0.00	0.00	0.013	0.00011
04-14-95	246	900	24.8	7.18	7.10							
04-15-95	247	1400	25.1	7.30	8.02							
04-16-95	248	1100	24.8	7.24	7.79							
04-17-95	249	900	24.6	7.28	7.64							
04-18-95	250	900	24.4	7.35	7.95							
04-19-95	251	900	24.7	7.35	8.10							
04-20-95	252	900	24.8	7.30	7.83	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.2	7.37	7.55							
04-22-95	254	1200	25.1	7.30	7.75							
04-23-95	255	2000	25.0	7.30	7.85							
04-24-95	256	900	24.3	7.39	7.65							
04-25-95	257	900	24.3	7.34	7.43							
04-26-95	258	900	24.0	7.34	7.35							
04-27-95	259	900	24.7	7.33	7.56	40.8	85.5	220	0.00	0.00	a	a
04-28-95	260	900	24.9	7.28	7.43							
04-29-95	261	1100	24.9	7.32	7.36							
04-30-95	262	1600	24.8	7.32	7.82							
05-01-95	263	900	24.9	7.37	8.21							
05-02-95	264	900	24.8	7.36	8.77							
05-03-95	265	900	24.5	7.35	7.80							
05-04-95	266	900	24.5	7.36	8.01	40.8	85.5	221	0.00	0.00	a	a
05-05-95	267	900	24.7	7.35	8.11							
05-06-95	268	830	24.7	7.23	7.75							
05-07-95	269	900	24.6	7.01	7.63							
05-08-95	270	900	24.7	7.20	7.76							
05-09-95	271	900	24.6	7.22	7.57							
05-10-95	272	900	25.2	7.21	7.55							
MEAN			23.3		7.58	51.9	163.8				0.107	0.00034
MINIMUM			17.9	6.62	2.75	34.0	68.4	212	0.00	0.00	0.013	0.00004
MAXIMUM			31.1	7.81	10.53	81.6	564.3	>1999	0.00	0.00	0.900	0.00106
Std Dev			1.96		1.469	11.72	123.10				0.1583	0.000259
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 2
TANK CONCENTRATION: 100% WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.01	6.68							
08-13-94	2	900	25.2	6.90	5.69							
08-14-94	3	900	25.2	7.02	5.49							
08-15-94	4	900	24.2	6.87	5.55							
08-16-94	5	1000	24.1	7.01	5.96							
08-17-94	6	1000	25.1	7.06	5.26							
08-18-94	7	900	24.8	6.82	5.27	47.6	85.5	918	0.00	0.00	0.273	0.00101
08-19-94	8	800	24.5	6.78	5.22							
08-20-94	9	1000	25.2	6.85	5.92							
08-21-94	10	800	25.5	6.88	5.61							
08-22-94	11	900	24.4	6.80	5.37							
08-23-94	12	730	23.0	6.81	6.31							
08-24-94	13	1000	24.0	6.69	6.44							
08-25-94	14	1100	23.7	6.82	6.27	54.4	119.7	739	0.00	0.00	0.112	0.00038
08-26-94	15	900	24.2	6.77	5.77							
08-27-94	16	900	24.0	6.82	5.44							
08-28-94	17	800	24.6	6.93	5.54							
08-29-94	18	900	25.3	6.89	4.87							
08-30-94	19	900	22.7	6.76	5.27							
08-31-94	20	800	24.3	7.07	6.35							
09-01-94	21	1100	24.6	6.91	6.05	68.0	136.8	543	0.00	0.00	a	a
09-02-94	22	900	23.7	6.78	5.56							
09-03-94	23	815	24.5	6.99	5.97							
09-04-94	24	810	24.3	6.98	6.06							
09-05-94	25	1100	24.6	6.83	6.41							
09-06-94	26	900	24.6	6.83	6.38							
09-07-94	27	800	24.1	6.86	6.50							
09-08-94	28	1100	24.1	6.90	6.30	74.8	136.8	603	0.00	0.00	0.053	0.00022
09-09-94	29	900	23.9	6.91	6.75							
09-10-94	30	900	24.4	6.89	6.13							
09-11-94	31	800	23.2	6.90	6.04							
09-12-94	32	500	24.1	7.09	6.35							

09-13-94	33	700	24.1	7.00	6.63							
09-14-94	34	1400	26.6	7.02	4.34							
09-15-94	35	1300	26.2	7.15	5.87							
09-16-94	36	1200	25.6	6.72	5.11	47.6	171.0	867	0.00	0.00	0.061	0.00019
09-17-94	37	820	25.5	6.83	5.20							
09-18-94	38	830	25.7	6.82	4.82							
09-19-94	39	1000	24.6	6.97	5.44							
09-20-94	40	1000	24.1	6.92	5.46							
09-21-94	41	1000	25.5	6.95	5.45							
09-22-94	42	900	24.4	6.91	5.79	74.8	119.7	709	0.00	0.00	a	a
09-23-94	43	1000	24.2	6.80	6.40							
09-24-94	44	845	24.1	6.76	6.08							
09-25-94	45	1300	25.3	a	6.00							
09-26-94	46	900	26.2	6.80	4.28							
09-27-94	47	800	25.2	6.72	5.58							
09-28-94	48	1000	24.4	6.74	5.31	47.6	136.8	925	a	a	a	a
09-29-94	49	1030	26.3	6.88	2.67							
09-30-94	50	1030	22.8	6.87	6.75							
10-01-94	51	900	23.5	7.04	6.44							
10-02-94	52	915	23.5	6.88	5.99							
10-03-94	53	1100	22.4	6.87	6.28							
10-04-94	54	1100	23.0	6.87	6.53							
10-05-94	55	1000	24.0	6.90	6.42							
10-06-94	56	800	22.9	6.96	6.84	74.8	153.9	785	0.00	0.00	a	a
10-07-94	57	1100	23.8	6.95	7.33						0.037	0.00017
10-08-94	58	1100	24.5	6.96	7.16							
10-09-94	59	1100	26.8	6.85	5.51							
10-10-94	60	1000	24.6	6.85	5.38							
10-11-94	61	1600	25.3	6.98	5.41							
10-12-94	62	900	21.9	6.94	7.79							
10-13-94	63	1300	23.8	6.84	7.15	54.4	307.8	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.79	6.21							
10-15-94	65	900	24.2	6.90	6.57							
10-16-94	66	900	23.8	6.70	7.36							
10-17-94	67	1000	23.3	6.84	7.28							
10-18-94	68	800	23.8	6.63	6.84							
10-19-94	69	900	24.4	6.74	7.20							
10-20-94	70	900	23.5	6.69	6.20	40.8	513.0	>1999	0.00	0.00	0.029	0.00007
10-21-94	71	900	21.5	6.77	6.98							
10-22-94	72	800	22.2	6.80	6.70							
10-23-94	73	900	23.1	6.76	6.80							
10-24-94	74	900	21.7	6.71	6.18							
10-25-94	75	900	22.3	6.70	6.45							
10-26-94	76	800	21.2	6.80	7.02							

10-27-94	77	1100	21.0	6.80	7.53	61.2	171.0	844	0.00	0.00	0.093	0.00025
10-28-94	78	1000	20.6	6.85	7.77							
10-29-94	79	900	20.7	6.90	7.88							
10-30-94	80	900	21.4	6.85	7.75							
10-31-94	81	1000	23.0	6.80	6.68							
11-01-94	82	1100	25.5	6.78	5.34							
11-02-94	83	1000	21.9	6.77	7.15							
11-03-94	84	1000	21.3	6.77	6.77							
11-04-94	85	1000	22.1	6.83	6.57	68.0	188.1	980	0.00	0.00	0.160	0.00050
11-05-94	86	1000	22.8	6.85	7.60							
11-06-94	87	1000	24.5	6.81	6.60							
11-07-94	88	700	22.2	6.79	7.37							
11-08-94	89	1000	20.8	6.85	8.21							
11-09-94	90	1000	22.2	6.74	7.39							
11-10-94	91	1100	22.4	6.87	6.81							
11-11-94	92	900	19.5	6.81	7.71	61.2	188.1	888	0.00	0.00	0.069	0.00017
11-12-94	93	845	18.4	6.74	8.27							
11-13-94	94	830	21.0	6.81	8.08							
11-14-94	95	1000	21.6	6.73	7.32							
11-15-94	96	900	22.2	6.74	7.26							
11-16-94	97	900	21.9	6.79	6.74	61.2	153.9	1121	0.00	0.00	0.055	0.00015
11-17-94	98	900	21.5	6.85	7.32							
11-18-94	99	900	24.7	6.73	7.13							
11-19-94	100	800	23.1	6.72	6.79							
11-20-94	101	900	23.0	6.78	7.02							
11-21-94	102	600	22.2	6.78	7.35							
11-22-94	103	600	23.6	6.83	7.10							
11-23-94	104	800	19.1	6.79	8.58	54.4	119.7	>1999	0.00	0.00	0.074	0.00017
11-24-94	105	730	22.9	6.77	8.38							
11-25-94	106	1020	22.6	7.10	9.69							
11-26-94	107	1000	20.1	6.77	10.42							
11-27-94	108	900	20.0	6.69	9.29							
11-28-94	109	900	21.7	6.75	9.03							
11-29-94	110	900	21.3	6.71	8.63							
11-30-94	111	900	21.4	6.63	8.49							
12-01-94	112	900	20.9	6.62	8.75	47.6	102.6	408	0.00	0.00	0.120	0.00021
12-02-94	113	1000	22.0	6.69	9.29							
12-03-94	114	1000	21.5	6.66	8.52							
12-04-94	115	1100	23.3	6.68	7.84							
12-05-94	116	900	25.2	6.73	7.05							
12-06-94	117	900	23.8	6.84	7.34							
12-07-94	118	800	23.4	6.86	7.98							
12-08-94	119	1100	26.7	6.85	5.70	54.4	102.6	448	0.00	0.00	0.085	0.00038
12-09-94	120	1000	23.0	6.88	7.37							

12-10-94	121	1300	23.1	6.86	7.84							
12-11-94	122	900	31.3	6.78	2.53							
12-12-94	123	900	24.9	7.72	8.19							
12-13-94	124	900	24.7	7.77	8.56							
12-14-94	125	900	24.6	7.78	8.70							
12-15-94	126	800	20.6	6.89	9.89	47.6	461.7	>1999	0.00	0.00	0.095	0.00030
12-16-94	127	1100	21.7	6.80	8.90							
12-17-94	128	845	21.9	6.66	8.77							
12-18-94	129	930	22.1	6.71	8.01							
12-19-94	130	1000	22.3	6.71	7.84							
12-20-94	131	1100	22.0	6.80	8.18							
12-21-94	132	1000	18.5	6.77	9.66	54.4	273.6	1977	0.00	0.00	0.130	0.00027
12-22-94	133	800	28.0	7.05	6.20							
12-23-94	134	1000	28.4	6.86	5.02							
12-24-94	135	900	28.1	7.08	6.59							
12-25-94	136	700	25.1	7.70	8.24							
12-26-94	137	1000	25.5	7.81	8.01							
12-27-94	138	1100	20.6	6.85	8.80							
12-28-94	139	1000	20.1	6.84	9.67							
12-29-94	140	900	19.8	6.73	8.61	54.4	239.4	1154	0.00	0.00	0.091	0.00019
12-30-94	141	1000	27.7	6.87	6.75							
12-31-94	142	1000	28.5	7.00	2.94							
01-01-95	143	1100	20.8	6.84	8.77							
01-02-95	144	1000	20.5	6.85	8.48							
01-03-95	145	1100	22.1	6.86	7.58							
01-04-95	146	900	19.0	6.93	9.58							
01-05-95	147	1100	26.3	7.21	4.70	74.8	119.7	537	0.00	0.00	0.031	0.00031
01-06-95	148	1000	23.2	7.55	8.70							
01-07-95	149	1130	24.3	7.61	9.16							
01-08-95	150	1030	23.9	7.61	9.14							
01-09-95	151	1000	23.8	7.70	9.61							
01-10-95	152	1000	19.8	6.77	9.74							
01-11-95	153	1000	20.2	6.97	8.80							
01-12-95	154	1100	20.5	6.70	8.36	47.6	119.7	424	0.00	0.00	0.036	0.00007
01-13-95	155	1000	21.0	6.70	8.24							
01-14-95	156	900	22.3	6.75	7.43							
01-15-95	157	800	25.3	6.85	6.51							
01-16-95	158	1030	23.6	6.82	6.68							
01-17-95	159	1000	23.1	6.82	7.93							
01-18-95	160	1000	23.4	7.01	6.75							
01-19-95	161	1000	23.2	7.07	7.87	61.2	564.3	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.9	6.93	7.69							
01-21-95	163	1000	23.2	6.81	7.20							
01-22-95	164	1100	22.2	6.93	7.82							

01-23-95	165	600	20.8	6.92	9.05							
01-24-95	166	1000	21.8	6.80	9.32							
01-25-95	167	1100	25.5	6.80	5.67							
01-26-95	168	1000	20.9	6.80	6.18	47.6	102.6	342	0.00	0.00	0.034	0.00009
01-27-95	169	1000	19.3	6.75	9.02							
01-28-95	170	830	20.0	6.72	8.64							
01-29-95	171	900	23.3	6.78	8.18							
01-30-95	172	1000	19.8	6.83	9.02							
01-31-95	173	1000	20.8	7.70	8.72							
02-01-95	174	1000	18.5	6.92	9.60							
02-02-95	175	900	19.8	6.76	8.48	54.4	153.9	648	0.00	0.00	0.088	0.00020
02-03-95	176	930	26.1	6.84	3.58							
02-04-95	177	1000	18.3	6.94	10.12							
02-05-95	178	1200	25.3	6.83	4.06							
02-06-95	179	930	21.8	7.49	8.59							
02-07-95	180	900	22.4	7.55	8.58							
02-08-95	181	900	22.4	7.50	8.89							
02-09-95	182	900	21.5	7.41	9.50	47.6	102.6	250	0.00	0.00	0.027	0.00030
02-10-95	183	900	22.0	7.37	9.09							
02-11-95	184	900	21.3	7.22	9.61							
02-12-95	185	1200	21.4	7.07	9.77							
02-13-95	186	900	21.0	7.25	9.83							
02-14-95	187	900	20.9	7.24	9.65							
02-15-95	188	900	21.3	7.30	9.80							
02-16-95	189	900	21.3	7.18	9.88	40.8	102.6	241	0.00	0.00	0.082	0.00054
02-17-95	190	900	22.2	7.21	9.36							
02-18-95	191	1100	22.4	7.09	9.89							
02-19-95	192	1400	22.8	7.08	9.61							
02-20-95	193	1000	22.5	7.21	9.30							
02-21-95	194	1000	22.7	7.30	9.27							
02-22-95	195	900	22.4	7.30	9.21							
02-23-95	196	1000	23.6	7.29	9.01	34.0	85.5	245	0.00	0.00	0.072	0.00070
02-24-95	197	1000	23.4	7.25	8.88							
02-25-95	198	1000	23.3	7.31	8.98							
02-26-95	199	1800	23.5	7.24	9.09							
02-27-95	200	900	23.3	7.27	8.94							
02-28-95	201	900	23.9	7.28	8.86							
03-01-95	202	900	23.8	7.23	8.78							
03-02-95	203	900	23.8	7.24	8.81	34.0	85.5	345	0.00	0.00	0.054	0.00048
03-03-95	204	900	23.3	7.27	8.84							
03-04-95	205	1000	22.8	7.25	8.91							
03-05-95	206	1015	22.9	7.12	9.01							
03-06-95	207	900	22.9	7.27	8.96							
03-07-95	208	900	23.0	7.22	8.80							

03-08-95	209	900	22.9	7.33	8.61							
03-09-95	210	1000	23.0	7.25	8.56	40.8	85.5	237	0.00	0.00	0.039	0.00034
03-10-95	211	900	24.5	7.20	8.29							
03-11-95	212	1100	23.7	7.22	8.60							
03-12-95	213	1800	24.8	7.19	8.36							
03-13-95	214	900	23.9	7.22	8.39							
03-14-95	215	900	24.0	7.26	8.86							
03-15-95	216	900	23.5	7.27	8.82							
03-16-95	217	900	24.4	7.19	8.90	47.6	85.5	214	0.00	0.00	0.019	0.00015
03-17-95	218	900	24.9	7.28	8.55							
03-18-95	219	1000	24.9	7.26	8.25							
03-19-95	220	1600	25.8	7.26	8.29							
03-20-95	221	900	24.5	7.26	8.48							
03-21-95	222	900	25.0	7.26	8.34							
03-22-95	223	900	24.8	7.23	8.46							
03-23-95	224	1100	24.9	7.21	8.31	47.6	85.5	231	0.00	0.00	a	a
03-24-95	225	900	24.8	7.26	7.52							
03-25-95	226	915	24.9	7.00	7.82							
03-26-95	227	900	24.7	7.03	8.56							
03-27-95	228	900	25.1	7.24	7.88							
03-28-95	229	900	24.8	7.24	7.56							
03-29-95	230	900	24.6	7.23	7.67							
03-30-95	231	900	24.8	7.24	7.59	47.6	85.5	218	0.00	0.00	0.058	0.00046
03-31-95	232	900	24.6	7.26	7.45							
04-01-95	233	900	24.5	7.04	7.75							
04-02-95	234	1000	24.6	6.96	8.26							
04-03-95	235	900	24.1	7.25	8.16							
04-04-95	236	900	24.6	7.29	7.85							
04-05-95	237	900	23.9	7.27	7.68							
04-06-95	238	900	24.3	7.30	8.01	40.8	85.5	226	0.00	0.00	0.062	0.00047
04-07-95	239	900	24.4	7.33	7.72							
04-08-95	240	1100	24.8	7.29	7.97							
04-09-95	241	1300	25.4	7.27	8.28							
04-10-95	242	900	24.9	7.26	7.50							
04-11-95	243	900	25.2	7.27	7.49							
04-12-95	244	900	25.3	7.29	7.39							
04-13-95	245	1100	25.2	7.30	7.43	40.8	85.5	246	0.00	0.00	0.051	0.00043
04-14-95	246	900	25.1	7.18	7.05							
04-15-95	247	1400	25.4	7.30	7.70							
04-16-95	248	1100	25.1	7.24	7.42							
04-17-95	249	900	24.9	7.28	7.44							
04-18-95	250	900	24.7	7.35	7.71							
04-19-95	251	900	25.1	7.35	7.75							
04-20-95	252	900	25.0	7.30	7.56	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.4	7.37	7.28							
04-22-95	254	1200	25.3	7.30	7.34							
04-23-95	255	2000	25.1	7.30	7.60							
04-24-95	256	900	24.5	7.39	7.39							
04-25-95	257	900	24.5	7.34	7.23							
04-26-95	258	900	24.2	7.34	7.13							
04-27-95	259	900	25.0	7.33	7.26	40.8	85.5	221	0.00	0.00	a	a
04-28-95	260	900	25.2	7.28	7.16							
04-29-95	261	1100	25.1	7.32	6.90							
04-30-95	262	1600	25.0	7.32	7.49							
05-01-95	263	900	25.0	7.37	7.95							
05-02-95	264	900	25.1	7.36	8.22							
05-03-95	265	900	24.8	7.35	7.48							
05-04-95	266	900	24.8	7.36	7.64	40.8	85.5	222	0.00	0.00	a	a
05-05-95	267	900	25.0	7.35	7.46							
05-06-95	268	830	24.8	7.21	7.48							
05-07-95	269	900	24.9	7.04	7.01							
05-08-95	270	900	24.8	7.20	7.43							
05-09-95	271	900	24.9	7.22	7.27							
05-10-95	272	900	25.5	7.21	7.35							
MEAN			23.5		7.45	52.1	159.8				0.076	0.00032
MINIMUM			18.3	6.62	2.53	34.0	68.4	214	0.00	0.00	0.019	0.00007
MAXIMUM			31.3	7.81	10.42	74.8	564.3	>1999	0.00	0.00	0.273	0.00101
Std Dev			1.92		1.419	11.28	116.72				0.0499	0.000201
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 3
TANK CONCENTRATION: 100% WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.01	6.75							
08-13-94	2	900	25.2	6.90	5.85							
08-14-94	3	900	25.1	7.02	5.66							
08-15-94	4	900	24.2	6.87	5.79							
08-16-94	5	1000	24.0	7.03	6.20							
08-17-94	6	1000	25.1	7.12	5.27							
08-18-94	7	900	24.8	6.81	4.78	47.6	85.5	922	0.00	0.00	0.425	0.00153
08-19-94	8	800	24.4	6.81	5.54							
08-20-94	9	1000	25.1	6.85	6.12							
08-21-94	10	800	25.4	6.88	5.85							
08-22-94	11	900	24.3	6.80	5.64							
08-23-94	12	730	23.0	6.81	6.55							
08-24-94	13	1000	23.9	6.69	6.64							
08-25-94	14	1100	23.7	6.82	6.50	54.4	102.6	739	0.00	0.00	0.105	0.00036
08-26-94	15	900	24.1	6.77	5.97							
08-27-94	16	900	24.0	6.82	5.66							
08-28-94	17	800	24.5	6.93	5.73							
08-29-94	18	900	25.2	6.89	5.10							
08-30-94	19	900	22.8	6.76	5.52							
08-31-94	20	800	24.3	7.07	6.47							
09-01-94	21	1100	24.6	6.91	6.31	68.0	136.8	546	0.00	0.00	a	a
09-02-94	22	900	23.7	6.78	5.87							
09-03-94	23	815	24.5	7.02	6.10							
09-04-94	24	810	24.2	7.01	6.07							
09-05-94	25	1100	24.5	6.83	6.59							
09-06-94	26	900	24.6	6.83	6.59							
09-07-94	27	800	24.1	6.86	6.76							
09-08-94	28	1100	24.0	6.90	6.59	74.8	136.8	602	0.00	0.00	0.028	0.00012
09-09-94	29	900	23.9	6.91	7.08							
09-10-94	30	900	24.3	6.89	6.37							
09-11-94	31	800	23.1	6.90	6.25							
09-12-94	32	500	23.9	7.09	6.58							

09-13-94	33	700	24.0	7.00	6.81							
09-14-94	34	1400	26.5	7.02	4.41							
09-15-94	35	1300	26.1	7.13	5.67							
09-16-94	36	1200	25.5	6.72	5.35	40.8	136.8	862	0.00	0.00	0.077	0.00024
09-17-94	37	820	25.4	6.84	5.17							
09-18-94	38	830	25.6	6.83	5.03							
09-19-94	39	1000	24.3	6.97	5.69							
09-20-94	40	1000	23.8	6.92	5.66							
09-21-94	41	1000	25.3	6.95	5.73							
09-22-94	42	900	24.2	6.91	6.01	74.8	119.7	706	0.00	0.00	a	a
09-23-94	43	1000	24.0	6.80	6.80							
09-24-94	44	845	24.0	6.81	6.27							
09-25-94	45	1300	25.2	a	6.27							
09-26-94	46	900	26.1	6.80	4.56							
09-27-94	47	800	25.1	6.72	5.76							
09-28-94	48	1000	24.3	6.77	5.74	47.6	136.8	907	a	a	a	a
09-29-94	49	1030	26.2	6.91	2.84							
09-30-94	50	1030	22.8	6.89	7.08							
10-01-94	51	900	23.5	7.06	6.67							
10-02-94	52	915	23.4	6.91	6.29							
10-03-94	53	1100	22.3	6.87	6.75							
10-04-94	54	1100	23.0	6.87	7.01							
10-05-94	55	1000	24.0	6.90	6.94							
10-06-94	56	800	22.8	6.96	7.17	74.8	119.7	785	0.00	0.00	a	a
10-07-94	57	1100	23.7	6.95	7.66						0.033	0.00015
10-08-94	58	1100	24.5	6.96	7.49							
10-09-94	59	1100	26.8	6.85	5.85							
10-10-94	60	1000	24.6	6.85	5.80							
10-11-94	61	1600	25.2	6.98	3.62							
10-12-94	62	900	21.8	6.94	7.89							
10-13-94	63	1300	23.8	6.84	7.26	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.79	6.24							
10-15-94	65	900	24.1	6.90	6.65							
10-16-94	66	900	23.7	6.70	7.42							
10-17-94	67	1000	23.0	6.84	7.53							
10-18-94	68	800	23.8	6.63	6.98							
10-19-94	69	900	24.4	6.74	7.32							
10-20-94	70	900	23.2	6.69	6.42	40.8	513.0	>1999	0.00	0.00	0.032	0.00008
10-21-94	71	900	21.1	6.77	7.24							
10-22-94	72	800	21.9	6.80	6.98							
10-23-94	73	900	22.8	6.76	7.13							
10-24-94	74	900	21.3	6.71	6.66							
10-25-94	75	900	21.8	6.70	6.80							
10-26-94	76	800	20.8	6.80	7.38							

10-27-94	77	1100	20.7	6.80	7.85	61.2	153.9	821	0.00	0.00	0.091	0.00024
10-28-94	78	1000	20.1	6.85	8.17							
10-29-94	79	900	20.3	6.90	8.05							
10-30-94	80	900	20.6	6.85	8.11							
10-31-94	81	1000	21.6	6.80	7.58							
11-01-94	82	1100	24.9	6.78	5.79							
11-02-94	83	1000	21.2	6.77	7.49							
11-03-94	84	1000	20.3	6.77	7.12							
11-04-94	85	1000	21.4	6.83	6.92	68.0	171.0	970	0.00	0.00	0.180	0.00053
11-05-94	86	1000	22.1	6.85	7.95							
11-06-94	87	1000	24.0	6.81	7.00							
11-07-94	88	700	21.3	6.79	7.92							
11-08-94	89	1000	20.2	6.85	8.93							
11-09-94	90	1000	22.2	6.74	7.97							
11-10-94	91	1100	22.3	6.87	7.18							
11-11-94	92	900	19.3	6.81	8.12	61.2	205.2	993	0.00	0.00	0.063	0.00015
11-12-94	93	845	18.2	6.75	8.37							
11-13-94	94	830	20.8	6.82	8.10							
11-14-94	95	1000	21.4	6.73	7.63							
11-15-94	96	900	22.1	6.74	7.46							
11-16-94	97	900	21.9	6.79	6.96	61.2	153.9	1228	0.00	0.00	0.058	0.00016
11-17-94	98	900	21.4	6.85	7.49							
11-18-94	99	900	24.9	6.73	6.53							
11-19-94	100	800	23.6	6.72	6.57							
11-20-94	101	900	22.9	6.78	7.19							
11-21-94	102	600	22.4	6.78	7.51							
11-22-94	103	600	23.6	6.83	7.30							
11-23-94	104	800	18.8	6.79	8.83	54.4	119.7	>1999	0.00	0.00	0.070	0.00015
11-24-94	105	730	22.7	6.78	8.72							
11-25-94	106	1020	21.9	7.09	9.71							
11-26-94	107	1000	19.3	6.77	6.64							
11-27-94	108	900	19.1	6.69	9.44							
11-28-94	109	900	21.1	6.75	9.17							
11-29-94	110	900	20.5	6.71	8.86							
11-30-94	111	900	20.7	6.63	8.71							
12-01-94	112	900	19.8	6.62	9.02	47.6	102.6	400	0.00	0.00	0.120	0.00020
12-02-94	113	1000	21.2	6.74	9.37							
12-03-94	114	1000	21.3	6.69	8.58							
12-04-94	115	1100	22.5	6.68	8.13							
12-05-94	116	900	24.5	6.73	7.31							
12-06-94	117	900	23.2	6.84	7.58							
12-07-94	118	800	22.8	6.86	8.33							
12-08-94	119	1100	26.4	6.85	5.80	54.4	119.7	435	0.00	0.00	0.089	0.00039
12-09-94	120	1000	22.5	6.88	7.64							

12-10-94	121	1300	22.5	6.86	8.16							
12-11-94	122	900	31.2	6.78	2.88							
12-12-94	123	900	24.5	7.72	8.37							
12-13-94	124	900	24.3	7.77	8.68							
12-14-94	125	900	24.2	7.78	8.83							
12-15-94	126	800	19.8	6.89	10.16	47.6	478.8	>1999	0.00	0.00	0.076	0.00023
12-16-94	127	1100	21.0	6.80	9.07							
12-17-94	128	845	21.4	6.69	8.79							
12-18-94	129	930	21.5	6.71	8.15							
12-19-94	130	1000	21.6	6.71	8.08							
12-20-94	131	1100	21.4	6.80	8.48							
12-21-94	132	1000	17.9	6.77	9.88	54.4	273.6	1972	0.00	0.00	0.120	0.00024
12-22-94	133	800	27.7	7.05	6.42							
12-23-94	134	1000	28.3	6.86	5.15							
12-24-94	135	900	27.8	7.08	6.70							
12-25-94	136	700	24.6	7.85	8.33							
12-26-94	137	1000	25.1	7.81	8.01							
12-27-94	138	1100	20.0	6.85	9.01							
12-28-94	139	1000	19.5	6.84	9.92							
12-29-94	140	900	19.2	6.73	8.84	54.4	239.4	1094	0.00	0.00	0.089	0.00018
12-30-94	141	1000	27.3	6.87	6.94							
12-31-94	142	1000	28.3	7.00	2.94							
01-01-95	143	1100	20.2	6.84	9.01							
01-02-95	144	1000	19.6	6.85	8.84							
01-03-95	145	1100	21.2	6.86	8.03							
01-04-95	146	900	17.7	6.93	9.98							
01-05-95	147	1100	26.2	7.21	4.79	74.8	102.6	534	0.00	0.00	0.033	0.00033
01-06-95	148	1000	22.9	7.58	8.63							
01-07-95	149	1130	24.0	7.63	9.21							
01-08-95	150	1030	23.5	7.63	8.96							
01-09-95	151	1000	23.5	7.70	9.55							
01-10-95	152	1000	19.2	6.77	9.68							
01-11-95	153	1000	19.6	6.97	8.92							
01-12-95	154	1100	20.2	6.70	8.13	47.6	119.7	424	0.00	0.00	0.018	0.00004
01-13-95	155	1000	20.5	6.70	8.07							
01-14-95	156	900	21.9	6.75	7.45							
01-15-95	157	800	25.0	6.85	6.57							
01-16-95	158	1030	23.5	6.82	6.93							
01-17-95	159	1000	22.7	6.82	8.00							
01-18-95	160	1000	23.2	7.01	6.82							
01-19-95	161	1000	22.8	7.07	7.92	61.2	530.1	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.4	6.93	7.73							
01-21-95	163	1000	22.8	6.81	7.12							
01-22-95	164	1100	21.6	6.93	7.82							

01-23-95	165	600	20.2	6.92	9.02							
01-24-95	166	1000	21.8	6.80	9.36							
01-25-95	167	1100	25.5	6.80	5.32							
01-26-95	168	1000	20.6	6.80	8.05	47.6	102.6	342	0.00	0.00	0.022	0.00006
01-27-95	169	1000	19.0	6.75	9.05							
01-28-95	170	830	19.9	6.75	8.47							
01-29-95	171	900	23.1	6.78	8.03							
01-30-95	172	1000	19.9	6.83	8.84							
01-31-95	173	1000	20.7	7.70	8.34							
02-01-95	174	1000	18.1	6.92	9.56							
02-02-95	175	900	19.3	6.76	8.68	54.4	153.9	638	0.00	0.00	0.085	0.00018
02-03-95	176	930	25.9	6.84	3.11							
02-04-95	177	1000	19.1	6.94	10.05							
02-05-95	178	1200	25.6	6.83	3.63							
02-06-95	179	930	22.2	7.49	7.97							
02-07-95	180	900	22.9	7.55	8.03							
02-08-95	181	900	22.8	7.50	8.52							
02-09-95	182	900	22.1	7.41	8.95	47.6	102.6	250	0.00	0.00	0.026	0.00031
02-10-95	183	900	22.4	7.37	8.68							
02-11-95	184	900	21.7	7.22	9.38							
02-12-95	185	1200	21.8	7.07	9.59							
02-13-95	186	900	21.6	7.25	9.45							
02-14-95	187	900	21.6	7.24	9.65							
02-15-95	188	900	21.8	7.30	9.31							
02-16-95	189	900	21.8	7.18	9.36	40.8	85.5	244	0.00	0.00	0.060	0.00041
02-17-95	190	900	23.0	7.21	9.15							
02-18-95	191	1100	23.2	7.09	9.67							
02-19-95	192	1400	23.4	7.08	9.46							
02-20-95	193	1000	23.3	7.21	9.14							
02-21-95	194	1000	23.3	7.30	9.24							
02-22-95	195	900	20.2	7.30	9.40							
02-23-95	196	1000	24.3	7.29	9.08	34.0	85.5	248	0.00	0.00	0.052	0.00050
02-24-95	197	1000	23.9	7.25	8.83							
02-25-95	198	1000	23.8	7.31	8.89							
02-26-95	199	1800	24.0	7.24	9.01							
02-27-95	200	900	23.7	7.27	8.90							
02-28-95	201	900	24.3	7.28	8.82							
03-01-95	202	900	24.3	7.23	8.76							
03-02-95	203	900	24.2	7.24	8.78	34.0	85.5	347	0.00	0.00	0.046	0.00042
03-03-95	204	900	23.8	7.27	8.77							
03-04-95	205	1000	23.2	7.25	8.89							
03-05-95	206	1015	23.2	7.13	9.05							
03-06-95	207	900	23.3	7.27	8.89							
03-07-95	208	900	23.4	7.22	8.61							

03-08-95	209	900	23.2	7.33	8.58							
03-09-95	210	1000	23.6	7.25	8.37	40.8	85.5	239	0.00	0.00	0.031	0.00034
03-10-95	211	900	24.8	7.20	8.19							
03-11-95	212	1100	24.0	7.22	8.66							
03-12-95	213	1800	25.1	7.19	8.37							
03-13-95	214	900	24.1	7.22	8.34							
03-14-95	215	900	24.3	7.26	8.69							
03-15-95	216	900	23.6	7.27	8.76							
03-16-95	217	900	24.8	7.19	8.80	47.6	85.5	214	0.00	0.00	0.019	0.00015
03-17-95	218	900	25.1	7.28	8.54							
03-18-95	219	1000	25.4	7.26	8.00							
03-19-95	220	1600	26.0	7.26	8.10							
03-20-95	221	900	24.8	7.26	8.25							
03-21-95	222	900	25.3	7.26	8.13							
03-22-95	223	900	25.2	7.23	8.27							
03-23-95	224	1100	25.1	7.21	8.12	47.6	85.5	232	0.00	0.00	a	a
03-24-95	225	900	25.1	7.26	7.21							
03-25-95	226	915	25.1	7.03	7.75							
03-26-95	227	900	25.2	7.05	8.47							
03-27-95	228	900	25.4	7.24	7.72							
03-28-95	229	900	25.1	7.24	7.51							
03-29-95	230	900	25.0	7.23	7.67							
03-30-95	231	900	25.2	7.24	7.53	47.6	85.5	218	0.00	0.00	0.043	0.00034
03-31-95	232	900	25.1	7.26	7.46							
04-01-95	233	900	25.0	7.06	7.78							
04-02-95	234	1000	25.0	6.99	8.12							
04-03-95	235	900	24.7	7.25	7.88							
04-04-95	236	900	25.0	7.29	7.70							
04-05-95	237	900	24.3	7.27	7.38							
04-06-95	238	900	24.7	7.30	7.74	40.8	85.5	226	0.00	0.00	0.059	0.00045
04-07-95	239	900	24.8	7.33	7.52							
04-08-95	240	1100	25.2	7.29	7.62							
04-09-95	241	1300	25.6	7.27	8.12							
04-10-95	242	900	25.3	7.26	7.25							
04-11-95	243	900	25.7	7.27	7.04							
04-12-95	244	900	25.6	7.29	7.17							
04-13-95	245	1100	25.7	7.30	7.25	40.8	85.5	247	0.00	0.00	0.051	0.00043
04-14-95	246	900	25.4	7.18	6.88							
04-15-95	247	1400	25.8	7.30	7.54							
04-16-95	248	1100	25.3	7.24	7.42							
04-17-95	249	900	25.2	7.28	7.25							
04-18-95	250	900	25.1	7.35	7.54							
04-19-95	251	900	25.5	7.35	7.62							
04-20-95	252	900	25.5	7.30	7.51	40.8	68.4	219	0.00	0.00	a	a

04-21-95	253	900	25.8	7.37	7.15							
04-22-95	254	1200	25.7	7.30	7.20							
04-23-95	255	2000	25.6	7.30	7.49							
04-24-95	256	900	24.9	7.39	7.14							
04-25-95	257	900	24.9	7.34	7.11							
04-26-95	258	900	24.7	7.34	7.03							
04-27-95	259	900	25.4	7.33	7.11	40.8	85.5	222	0.00	0.00	a	a
04-28-95	260	900	25.6	7.28	6.95							
04-29-95	261	1100	25.6	7.32	6.88							
04-30-95	262	1600	25.4	7.32	7.47							
05-01-95	263	900	25.6	7.37	7.75							
05-02-95	264	900	25.5	7.36	8.19							
05-03-95	265	900	25.4	7.35	7.35							
05-04-95	266	900	25.3	7.36	7.50	40.8	85.5	223	0.00	0.00	a	a
05-05-95	267	900	25.4	7.35	7.45							
05-06-95	268	830	25.4	7.24	7.38							
05-07-95	269	900	25.2	7.04	7.24							
05-08-95	270	900	25.4	7.20	7.45							
05-09-95	271	900	25.3	7.22	7.28							
05-10-95	272	900	25.8	7.21	7.34							
MEAN			23.5		7.50	51.9	155.7				0.076	0.00031
MINIMUM			17.7	6.62	2.84	34.0	68.4	214	0.00	0.00	0.018	0.00004
MAXIMUM			31.2	7.85	10.16	74.8	530.1	>1999	0.00	0.00	0.425	0.00153
Std Dev			2.11		1.360	11.40	115.03				0.0753	0.000266
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 4
TANK CONCENTRATION: 100% WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	7.01	6.72							
08-13-94	2	900	25.2	6.90	5.77							
08-14-94	3	900	25.1	7.02	5.55							
08-15-94	4	900	24.2	6.87	5.52							
08-16-94	5	1000	24.0	7.03	5.91							
08-17-94	6	1000	25.0	7.06	5.10							
08-18-94	7	900	24.7	6.78	4.89	47.6	85.5	918	0.00	0.00	0.535	0.00179
08-19-94	8	800	24.4	6.81	5.22							
08-20-94	9	1000	25.1	6.85	5.96							
08-21-94	10	800	25.4	6.88	5.65							
08-22-94	11	900	24.3	6.80	5.44							
08-23-94	12	900	22.8	6.81	6.41							
08-24-94	13	1000	23.9	6.69	6.52							
08-25-94	14	1100	23.7	6.82	6.35	54.4	102.6	732	0.00	0.00	0.118	0.00040
08-26-94	15	900	24.1	6.77	5.88							
08-27-94	16	900	24.0	6.82	5.55							
08-28-94	17	800	24.5	6.93	5.60							
08-29-94	18	900	25.3	6.89	4.97							
08-30-94	19	900	22.8	6.76	5.29							
08-31-94	20	800	24.4	7.07	6.42							
09-01-94	21	1100	24.6	6.91	6.12	68.0	136.8	555	0.00	0.00	a	a
09-02-94	22	900	23.7	6.78	5.58							
09-03-94	23	815	24.5	7.01	6.00							
09-04-94	24	810	24.3	7.01	6.09							
09-05-94	25	1100	24.6	6.83	6.32							
09-06-94	26	900	24.6	6.83	6.34							
09-07-94	27	800	24.2	6.86	6.65							
09-08-94	28	1100	24.1	6.90	6.59	68.0	119.7	598	0.00	0.00	0.042	0.00018
09-09-94	29	900	24.0	6.91	7.02							
09-10-94	30	900	24.5	6.89	6.38							
09-11-94	31	800	23.4	6.90	6.34							
09-12-94	32	500	24.2	7.09	6.50							

09-13-94	33	700	24.4	7.00	6.78							
09-14-94	34	1400	26.5	7.02	4.42							
09-15-94	35	1300	26.2	7.16	5.33							
09-16-94	36	1200	25.6	6.72	5.46	47.6	136.8	857	0.00	0.00	0.090	0.00028
09-17-94	37	820	25.4	6.88	5.42							
09-18-94	38	830	25.6	6.88	5.10							
09-19-94	39	1000	24.6	6.97	5.51							
09-20-94	40	1000	24.2	6.92	5.52							
09-21-94	41	1000	25.3	6.95	5.77							
09-22-94	42	900	24.3	6.91	5.98	74.8	119.7	711	0.00	0.00	a	a
09-23-94	43	1000	24.1	6.80	6.68							
09-24-94	44	845	24.0	b	6.14							
09-25-94	45	1300	25.2	a	6.17							
09-26-94	46	900	26.3	6.80	4.43							
09-27-94	47	800	25.0	6.72	5.71							
09-28-94	48	1000	24.3	6.76	5.67	47.6	136.8	925	a	a	a	a
09-29-94	49	1030	26.2	6.92	2.69							
09-30-94	50	1030	22.8	6.91	7.05							
10-01-94	51	900	23.5	7.07	6.61							
10-02-94	52	915	23.4	6.90	6.21							
10-03-94	53	1100	22.3	6.87	6.51							
10-04-94	54	1100	22.9	6.87	6.63							
10-05-94	55	1000	23.8	6.90	6.51							
10-06-94	56	800	22.6	6.96	7.21	74.8	119.7	780	0.00	0.00	a	a
10-07-94	57	1100	23.7	6.95	7.67						0.033	0.00015
10-08-94	58	1100	24.3	6.96	7.58							
10-09-94	59	1100	26.6	6.85	5.91							
10-10-94	60	1000	24.4	6.85	5.83							
10-11-94	61	1600	25.2	6.98	3.95							
10-12-94	62	900	21.8	6.94	7.82							
10-13-94	63	1300	23.7	6.84	7.29	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.2	6.79	6.28							
10-15-94	65	900	24.0	6.90	6.69							
10-16-94	66	900	23.7	6.70	7.47							
10-17-94	67	1000	23.1	6.84	7.53							
10-18-94	68	800	23.7	6.63	7.01							
10-19-94	69	900	24.3	6.74	7.32							
10-20-94	70	900	23.4	6.69	6.40	40.8	513.0	>1999	0.00	0.00	0.029	0.00007
10-21-94	71	900	21.3	6.77	7.19							
10-22-94	72	800	22.1	6.80	6.83							
10-23-94	73	900	23.0	6.76	6.89							
10-24-94	74	900	21.5	6.71	6.35							
10-25-94	75	900	22.1	6.70	6.52							
10-26-94	76	800	21.0	6.80	7.34							

10-27-94	77	1100	21.0	6.80	7.79	61.2	153.9	864	0.00	0.00	0.090	0.00024
10-28-94	78	1000	20.6	6.85	8.06							
10-29-94	79	900	20.7	6.90	7.98							
10-30-94	80	900	21.2	6.85	8.01							
10-31-94	81	1000	22.3	6.80	7.44							
11-01-94	82	1100	25.6	6.78	5.33							
11-02-94	83	1000	22.3	6.77	7.24							
11-03-94	84	1000	21.5	6.77	6.92							
11-04-94	85	1000	22.5	6.83	6.70	68.0	171.0	998	0.00	0.00	0.190	0.00061
11-05-94	86	1000	23.0	6.85	7.69							
11-06-94	87	1000	24.8	6.81	6.59							
11-07-94	88	700	22.4	6.79	7.60							
11-08-94	89	1000	20.8	6.85	8.55							
11-09-94	90	1000	21.7	6.74	7.98							
11-10-94	91	1100	22.0	6.87	7.31							
11-11-94	92	900	19.2	6.81	8.03	61.1	188.1	914	0.00	0.00	0.062	0.00015
11-12-94	93	845	18.1	6.74	8.28							
11-13-94	94	830	20.6	6.85	8.20							
11-14-94	95	1000	21.3	6.73	7.56							
11-15-94	96	900	21.9	6.74	7.50							
11-16-94	97	900	21.6	6.79	7.00	61.2	136.8	1082	0.00	0.00	0.052	0.00014
11-17-94	98	900	21.0	6.85	7.64							
11-18-94	99	900	24.2	6.73	7.43							
11-19-94	100	800	22.2	6.72	7.00							
11-20-94	101	900	22.3	6.78	7.25							
11-21-94	102	600	21.5	6.78	7.56							
11-22-94	103	600	23.0	6.86	7.42							
11-23-94	104	800	18.6	6.79	8.84	54.4	119.7	1845	0.00	0.00	0.071	0.00016
11-24-94	105	730	22.8	6.78	8.54							
11-25-94	106	1020	22.1	7.15	9.65							
11-26-94	107	1000	19.6	6.77	10.54							
11-27-94	108	900	19.5	6.69	9.44							
11-28-94	109	900	21.2	6.75	9.13							
11-29-94	110	900	20.7	6.71	8.80							
11-30-94	111	900	21.0	6.63	8.58							
12-01-94	112	900	20.3	6.62	8.82	47.6	102.6	412	0.00	0.00	0.120	0.00020
12-02-94	113	1000	21.6	6.71	9.18							
12-03-94	114	1000	21.4	6.66	8.30							
12-04-94	115	1100	23.1	6.68	7.57							
12-05-94	116	900	25.0	6.73	6.81							
12-06-94	117	900	23.7	6.84	7.12							
12-07-94	118	800	23.4	6.86	7.87							
12-08-94	119	1100	26.7	6.85	5.39	54.4	119.7	466	0.00	0.00	0.099	0.00045
12-09-94	120	1000	23.1	6.88	7.17							

12-10-94	121	1300	22.9	6.86	8.05							
12-11-94	122	900	31.2	6.78	2.82							
12-12-94	123	900	24.9	7.72	8.09							
12-13-94	124	900	24.6	7.77	8.48							
12-14-94	125	900	24.4	7.78	8.61							
12-15-94	126	800	20.4	6.89	9.98	47.6	461.7	>1999	0.00	0.00	0.078	0.00025
12-16-94	127	1100	21.5	6.80	8.94							
12-17-94	128	845	21.8	6.71	8.75							
12-18-94	129	930	21.8	6.73	8.11							
12-19-94	130	1000	22.2	6.71	7.94							
12-20-94	131	1100	21.7	6.80	8.43							
12-21-94	132	1000	18.4	6.77	9.86	54.4	273.6	1980	0.00	0.00	0.110	0.00023
12-22-94	133	800	27.7	7.05	6.80							
12-23-94	134	1000	28.4	6.86	5.42							
12-24-94	135	900	28.0	7.08	6.94							
12-25-94	136	700	24.7	7.81	8.28							
12-26-94	137	1000	25.3	7.81	8.10							
12-27-94	138	1100	20.4	6.85	9.02							
12-28-94	139	1000	20.1	6.84	9.88							
12-29-94	140	900	19.7	6.73	8.80	54.4	239.4	1167	0.00	0.00	0.081	0.00017
12-30-94	141	1000	27.4	6.87	6.97							
12-31-94	142	1000	28.3	7.00	3.01							
01-01-95	143	1100	20.7	6.84	8.94							
01-02-95	144	1000	20.2	6.85	8.68							
01-03-95	145	1100	21.7	6.86	7.68							
01-04-95	146	900	18.8	6.93	9.62							
01-05-95	147	1100	26.3	7.21	4.71	74.8	102.6	541	0.00	0.00	0.034	0.00034
01-06-95	148	1000	23.2	7.60	8.58							
01-07-95	149	1130	24.0	7.69	9.52							
01-08-95	150	1030	23.7	7.67	9.26							
01-09-95	151	1000	23.6	7.70	9.75							
01-10-95	152	1000	19.4	6.77	10.10							
01-11-95	153	1000	19.8	6.97	8.95							
01-12-95	154	1100	20.5	6.70	8.53	47.6	119.7	419	0.00	0.00	0.020	0.00004
01-13-95	155	1000	20.6	6.70	8.43							
01-14-95	156	900	22.0	6.75	7.57							
01-15-95	157	800	25.1	6.85	6.74							
01-16-95	158	1030	23.7	6.82	7.25							
01-17-95	159	1000	23.0	6.82	8.30							
01-18-95	160	1000	23.5	7.01	7.14							
01-19-95	161	1000	23.0	7.07	8.19	61.2	547.2	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.6	6.93	7.91							
01-21-95	163	1000	23.1	6.81	7.21							
01-22-95	164	1100	22.0	6.93	7.87							

01-23-95	165	600	20.3	6.92	9.08							
01-24-95	166	1000	21.5	6.80	9.50							
01-25-95	167	1100	25.7	6.80	5.76							
01-26-95	168	1000	20.4	6.80	8.37	47.6	102.6	340	0.00	0.00	0.019	0.00005
01-27-95	169	1000	18.9	6.75	9.34							
01-28-95	170	830	19.6	6.72	8.81							
01-29-95	171	900	22.9	6.78	8.43							
01-30-95	172	1000	19.6	6.83	9.31							
01-31-95	173	1000	20.7	7.70	8.65							
02-01-95	174	1000	18.5	6.92	9.70							
02-02-95	175	900	19.6	6.76	8.76	54.4	153.9	644	0.00	0.00	0.077	0.00017
02-03-95	176	930	25.9	6.84	3.93							
02-04-95	177	1000	18.6	6.94	10.49							
02-05-95	178	1200	25.2	6.83	4.36							
02-06-95	179	930	21.8	7.49	8.77							
02-07-95	180	900	22.5	7.55	8.66							
02-08-95	181	900	22.4	7.50	9.16							
02-09-95	182	900	21.6	7.41	9.56	47.6	102.6	247	0.00	0.00	0.020	0.00023
02-10-95	183	900	21.9	7.37	9.38							
02-11-95	184	900	21.4	7.22	9.85							
02-12-95	185	1200	21.4	7.07	10.05							
02-13-95	186	900	21.2	7.25	10.03							
02-14-95	187	900	21.1	7.24	9.86							
02-15-95	188	900	21.2	7.30	9.86							
02-16-95	189	900	21.4	7.18	9.90	40.8	85.5	241	0.00	0.00	0.045	0.00030
02-17-95	190	900	22.5	7.21	9.47							
02-18-95	191	1100	22.9	7.09	10.05							
02-19-95	192	1400	23.1	7.08	9.77							
02-20-95	193	1000	23.1	7.21	9.47							
02-21-95	194	1000	23.1	7.30	9.49							
02-22-95	195	900	22.8	7.30	9.44							
02-23-95	196	1000	24.2	7.29	9.18	34.0	85.5	247	0.00	0.00	0.044	0.00050
02-24-95	197	1000	23.9	7.25	8.94							
02-25-95	198	1000	23.7	7.31	9.16							
02-26-95	199	1800	23.9	7.24	9.20							
02-27-95	200	900	23.6	7.27	9.11							
02-28-95	201	900	24.2	7.28	9.05							
03-01-95	202	900	24.3	7.23	8.95							
03-02-95	203	900	24.1	7.24	9.10	34.0	85.5	345	0.00	0.00	0.034	0.00031
03-03-95	204	900	23.8	7.27	9.02							
03-04-95	205	1000	23.5	7.25	8.93							
03-05-95	206	1015	23.5	7.14	9.04							
03-06-95	207	900	23.6	7.27	8.96							
03-07-95	208	900	23.7	7.22	8.78							

03-08-95	209	900	23.4	7.33	8.75							
03-09-95	210	1000	23.7	7.22	8.56	40.8	85.5	239	0.00	0.00	0.027	0.00025
03-10-95	211	900	25.1	7.20	8.19							
03-11-95	212	1100	24.4	7.22	8.48							
03-12-95	213	1800	25.5	7.19	8.08							
03-13-95	214	900	24.6	7.22	8.11							
03-14-95	215	900	24.8	7.26	8.54							
03-15-95	216	900	24.1	7.27	8.56							
03-16-95	217	900	25.3	7.19	8.62	47.6	85.5	215	0.00	0.00	0.018	0.00014
03-17-95	218	900	25.6	7.28	8.36							
03-18-95	219	1000	25.3	7.26	8.10							
03-19-95	220	1600	26.0	7.26	8.18							
03-20-95	221	900	24.8	7.26	8.37							
03-21-95	222	900	25.3	7.26	8.32							
03-22-95	223	900	25.2	7.23	8.48							
03-23-95	224	1100	25.2	7.21	8.12	47.6	85.5	231	0.00	0.00	a	a
03-24-95	225	900	25.1	7.26	7.53							
03-25-95	226	915	25.1	7.06	7.78							
03-26-95	227	900	25.1	6.99	8.63							
03-27-95	228	900	25.3	7.24	8.19							
03-28-95	229	900	25.2	7.24	7.60							
03-29-95	230	900	25.0	7.23	7.85							
03-30-95	231	900	25.3	7.24	7.59	47.6	85.5	218	0.00	0.00	0.045	0.00036
03-31-95	232	900	25.1	7.26	7.64							
04-01-95	233	900	25.1	7.08	7.82							
04-02-95	234	1000	25.1	7.00	8.25							
04-03-95	235	900	24.6	7.25	8.16							
04-04-95	236	900	25.1	7.29	7.66							
04-05-95	237	900	24.3	7.27	7.60							
04-06-95	238	900	24.8	7.30	7.70	40.8	85.5	226	0.00	0.00	0.058	0.00044
04-07-95	239	900	24.8	7.33	7.74							
04-08-95	240	1100	25.2	7.29	7.85							
04-09-95	241	1300	25.7	7.27	8.23							
04-10-95	242	900	25.3	7.26	7.43							
04-11-95	243	900	25.7	7.27	7.45							
04-12-95	244	900	25.6	7.29	7.40							
04-13-95	245	1100	25.6	7.30	7.30	40.8	85.5	246	0.00	0.00	0.048	0.00041
04-14-95	246	900	25.4	7.18	7.13							
04-15-95	247	1400	25.8	7.30	7.78							
04-16-95	248	1100	25.3	7.24	7.67							
04-17-95	249	900	25.2	7.28	7.58							
04-18-95	250	900	25.0	7.35	7.74							
04-19-95	251	900	25.4	7.35	7.95							
04-20-95	252	900	25.5	7.30	7.73	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.8	7.37	7.49							
04-22-95	254	1200	25.6	7.30	7.50							
04-23-95	255	2000	25.5	7.30	7.80							
04-24-95	256	900	24.8	7.39	7.54							
04-25-95	257	900	24.9	7.34	7.29							
04-26-95	258	900	24.6	7.34	7.26							
04-27-95	259	900	25.3	7.33	7.35	40.8	85.5	222	0.00	0.00	a	a
04-28-95	260	900	25.2	7.28	7.25							
04-29-95	261	1100	25.4	7.32	7.00							
04-30-95	262	1600	25.3	7.32	7.76							
05-01-95	263	900	25.5	7.37	7.98							
05-02-95	264	900	25.4	7.36	8.43							
05-03-95	265	900	25.3	7.35	7.49							
05-04-95	266	900	25.2	7.36	7.71	40.8	85.5	223	0.00	0.00	a	a
05-05-95	267	900	25.3	7.35	7.62							
05-06-95	268	830	25.2	7.19	7.49							
05-07-95	269	900	25.2	7.03	7.07							
05-08-95	270	900	25.2	7.20	7.68							
05-09-95	271	900	25.1	7.22	7.58							
05-10-95	272	900	25.8	7.21	7.63							
MEAN			23.6		7.57	51.9	154.4				0.079	0.00031
MINIMUM			18.1	6.62	2.69	34.0	68.4	215	0.00	0.00	0.018	0.00004
MAXIMUM			31.2	7.81	10.54	74.8	547.2	>1999	0.00	0.00	0.535	0.00179
Std Dev			2.04		1.425	10.96	115.28				0.0943	0.000311
N			272	270	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.
[b]A value of 8.84 was entered in the daily log; however, the value appeard to be a data entry error because all other values for that date were in the 6.8 range. Thus, the value of 8.84 was omitted.

TANK No. 5
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.00	7.03							
08-13-94	2	900	25.3	6.89	5.72							
08-14-94	3	900	25.3	7.02	5.57							
08-15-94	4	900	24.1	6.82	5.74							
08-16-94	5	1000	24.1	6.94	5.99							
08-17-94	6	1000	25.1	7.06	4.80							
08-18-94	7	900	24.8	6.87	4.70	47.6	85.5	917	0.00	0.00	0.693	0.00287
08-19-94	8	800	24.4	6.80	5.59							
08-20-94	9	1000	25.2	6.84	6.19							
08-21-94	10	800	25.5	6.86	5.94							
08-22-94	11	900	24.4	6.81	5.67							
08-23-94	12	730	22.3	6.83	5.85							
08-24-94	13	1000	24.0	6.68	6.69							
08-25-94	14	1100	23.8	6.82	6.56	54.4	119.7	742	0.00	0.00	0.128	0.00044
08-26-94	15	900	24.1	6.77	6.06							
08-27-94	16	900	24.0	6.82	5.81							
08-28-94	17	800	24.5	6.92	5.83							
08-29-94	18	900	25.3	6.88	5.24							
08-30-94	19	900	22.6	6.78	5.68							
08-31-94	20	800	24.4	7.06	6.52							
09-01-94	21	1100	24.6	6.88	6.32	68.0	136.8	549	0.00	0.00	a	a
09-02-94	22	900	23.7	6.78	5.86							
09-03-94	23	815	24.5	7.01	6.07							
09-04-94	24	810	24.1	7.06	6.04							
09-05-94	25	1100	24.6	6.83	6.51							
09-06-94	26	900	24.5	6.83	6.53							
09-07-94	27	800	24.1	6.86	6.77							
09-08-94	28	1100	24.0	6.90	6.62	74.8	119.7	599	0.00	0.00	0.030	0.00013
09-09-94	29	900	23.9	6.91	7.09							
09-10-94	30	900	24.3	6.89	6.41							
09-11-94	31	800	23.0	6.90	6.30							
09-12-94	32	500	23.9	7.09	6.50							

09-13-94	33	700	24.0	6.98	6.71							
09-14-94	34	1400	26.8	6.98	4.29							
09-15-94	35	1300	26.3	7.10	5.11							
09-16-94	36	1200	25.6	6.65	5.26	40.8	136.8	846	0.00	0.00	0.067	0.00018
09-17-94	37	820	25.6	6.81	5.53							
09-18-94	38	830	25.6	6.83	5.08							
09-19-94	39	1000	24.4	6.95	5.67							
09-20-94	40	1000	24.0	6.89	5.61							
09-21-94	41	1000	25.6	6.90	5.62							
09-22-94	42	900	24.4	6.88	5.94	68.0	119.7	706	0.00	0.00	a	a
09-23-94	43	1000	24.1	6.77	6.62							
09-24-94	44	845	24.1	6.77	6.16							
09-25-94	45	1300	25.2	a	5.78							
09-26-94	46	900	26.3	6.78	3.82							
09-27-94	47	800	25.0	6.70	5.84							
09-28-94	48	1000	24.2	6.73	5.87	47.6	119.7	908	a	a	a	a
09-29-94	49	1030	26.1	6.88	2.83							
09-30-94	50	1030	22.4	6.83	7.00							
10-01-94	51	900	23.1	7.00	6.67							
10-02-94	52	915	22.8	6.87	6.49							
10-03-94	53	1100	21.7	6.84	6.74							
10-04-94	54	1100	22.6	6.86	6.91							
10-05-94	55	1000	23.5	6.88	6.85							
10-06-94	56	800	22.5	6.95	7.36	74.8	119.7	780	0.00	0.00	a	a
10-07-94	57	1100	23.4	6.92	7.81						0.025	0.00011
10-08-94	58	1100	24.2	6.91	7.70							
10-09-94	59	1100	26.7	6.85	6.05							
10-10-94	60	1000	24.3	6.82	6.05							
10-11-94	61	1600	25.4	6.92	2.86							
10-12-94	62	900	21.6	6.94	7.88							
10-13-94	63	1300	23.7	6.84	7.39	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.2	6.78	6.50							
10-15-94	65	900	24.0	6.88	6.84							
10-16-94	66	900	23.4	6.69	7.59							
10-17-94	67	1000	22.9	6.83	7.63							
10-18-94	68	800	23.4	6.62	7.13							
10-19-94	69	900	24.1	6.71	7.40							
10-20-94	70	900	24.0	6.62	6.25	34.0	495.9	>1999	0.00	0.00	0.029	0.00006
10-21-94	71	900	22.1	6.72	7.04							
10-22-94	72	800	22.5	6.78	6.78							
10-23-94	73	900	23.3	6.71	6.93							
10-24-94	74	900	21.9	6.69	6.37							
10-25-94	75	900	22.6	6.70	6.53							
10-26-94	76	800	21.6	6.78	7.16							

10-27-94	77	1100	21.5	6.75	7.62	61.2	153.9	847	0.00	0.00	0.088	0.00022
10-28-94	78	1000	21.0	6.84	7.96							
10-29-94	79	900	21.2	6.90	7.91							
10-30-94	80	900	21.6	6.85	7.87							
10-31-94	81	1000	22.6	6.80	7.28							
11-01-94	82	1100	25.2	6.76	5.53							
11-02-94	83	1000	22.3	6.77	7.17							
11-03-94	84	1000	21.5	6.74	6.83							
11-04-94	85	1000	22.2	6.81	6.67	68.0	171.0	970	0.00	0.00	0.190	0.00057
11-05-94	86	1000	22.8	6.83	7.71							
11-06-94	87	1000	24.4	6.79	6.83							
11-07-94	88	700	22.2	6.76	7.63							
11-08-94	89	1000	20.8	6.85	8.34							
11-09-94	90	1000	22.2	6.74	7.51							
11-10-94	91	1100	22.5	6.86	6.82							
11-11-94	92	900	19.7	6.79	7.88	54.4	171.0	885	0.00	0.00	0.070	0.00017
11-12-94	93	845	18.6	6.75	8.47							
11-13-94	94	830	21.1	6.85	8.24							
11-14-94	95	1000	21.7	6.73	7.54							
11-15-94	96	900	22.2	6.74	7.34							
11-16-94	97	900	21.9	6.79	6.89	54.4	136.8	1114	0.00	0.00	0.041	0.00011
11-17-94	98	900	21.4	6.85	7.41							
11-18-94	99	900	24.8	6.73	7.12							
11-19-94	100	800	23.3	6.72	6.82							
11-20-94	101	900	23.1	6.78	7.16							
11-21-94	102	600	22.2	6.78	7.46							
11-22-94	103	600	23.7	6.80	7.18							
11-23-94	104	800	19.6	6.77	8.70	54.4	102.6	>1999	0.00	0.00	0.089	0.00020
11-24-94	105	730	22.8	6.76	8.63							
11-25-94	106	1020	22.7	7.12	9.48							
11-26-94	107	1000	20.3	6.75	10.43							
11-27-94	108	900	20.3	6.69	9.37							
11-28-94	109	900	22.0	6.72	9.05							
11-29-94	110	900	21.4	6.68	8.72							
11-30-94	111	900	21.5	6.63	8.51							
12-01-94	112	900	21.1	6.62	8.78	47.6	102.6	412	0.00	0.00	0.110	0.00020
12-02-94	113	1000	21.5	6.72	9.39							
12-03-94	114	1000	21.2	6.74	8.72							
12-04-94	115	1100	22.7	6.69	8.11							
12-05-94	116	900	24.4	6.71	7.31							
12-06-94	117	900	23.2	6.81	7.67							
12-07-94	118	800	22.8	6.80	8.42							
12-08-94	119	1100	26.1	6.80	6.06	54.4	102.6	446	0.00	0.00	0.094	0.00036
12-09-94	120	1000	22.5	6.85	7.61							

12-10-94	121	1300	22.3	6.84	8.14							
12-11-94	122	900	31.2	6.68	2.74							
12-12-94	123	900	24.6	7.66	8.20							
12-13-94	124	900	24.4	7.69	8.52							
12-14-94	125	900	24.3	7.67	8.61							
12-15-94	126	800	20.6	6.86	10.01	47.6	495.9	>1999	0.00	0.00	0.082	0.00025
12-16-94	127	1100	21.6	6.77	8.92							
12-17-94	128	845	22.0	6.73	8.83							
12-18-94	129	930	22.1	6.74	8.14							
12-19-94	130	1000	22.5	6.71	8.10							
12-20-94	131	1100	22.1	6.80	8.52							
12-21-94	132	1000	18.9	6.77	9.74	54.4	273.6	1964	0.00	0.00	0.110	0.00024
12-22-94	133	800	27.9	7.05	6.40							
12-23-94	134	1000	28.3	6.82	4.98							
12-24-94	135	900	28.0	7.08	6.61							
12-25-94	136	700	25.0	7.77	8.22							
12-26-94	137	1000	25.5	7.72	7.98							
12-27-94	138	1100	20.8	6.82	8.93							
12-28-94	139	1000	20.6	6.80	9.74							
12-29-94	140	900	20.1	6.70	8.70	54.4	205.2	1125	0.00	0.00	0.074	0.00015
12-30-94	141	1000	27.8	6.87	6.75							
12-31-94	142	1000	28.3	6.98	3.03							
01-01-95	143	1100	21.3	6.80	8.67							
01-02-95	144	1000	20.8	6.81	8.48							
01-03-95	145	1100	22.0	6.80	7.51							
01-04-95	146	900	19.2	6.90	9.45							
01-05-95	147	1100	26.4	7.19	4.72	74.8	102.6	531	0.00	0.00	0.040	0.00039
01-06-95	148	1000	23.7	7.57	8.42							
01-07-95	149	1130	24.7	7.64	8.98							
01-08-95	150	1030	24.2	7.63	8.86							
01-09-95	151	1000	24.3	7.63	9.24							
01-10-95	152	1000	20.2	6.70	9.66							
01-11-95	153	1000	20.5	6.85	8.73							
01-12-95	154	1100	21.1	6.68	8.21	40.8	119.7	427	0.00	0.00	0.018	0.00004
01-13-95	155	1000	21.5	6.73	8.03							
01-14-95	156	900	22.7	6.71	7.34							
01-15-95	157	800	25.4	6.85	6.46							
01-16-95	158	1030	24.1	6.33	6.74							
01-17-95	159	1000	23.5	6.82	7.91							
01-18-95	160	1000	23.9	7.00	6.59							
01-19-95	161	1000	23.4	7.10	7.82	61.2	547.2	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.9	6.87	7.41							
01-21-95	163	1000	24.0	6.75	6.82							
01-22-95	164	1100	22.9	6.90	7.63							

01-23-95	165	600	21.3	6.86	8.98							
01-24-95	166	1000	22.5	6.79	9.17							
01-25-95	167	1100	24.9	6.80	5.63							
01-26-95	168	1000	21.1	6.78	8.18	47.6	102.6	343	0.00	0.00	0.018	0.00005
01-27-95	169	1000	19.3	6.72	9.02							
01-28-95	170	830	20.2	6.75	8.67							
01-29-95	171	900	23.2	6.78	8.21							
01-30-95	172	1000	20.2	6.83	9.01							
01-31-95	173	1000	20.9	7.62	8.47							
02-01-95	174	1000	19.5	6.93	9.42							
02-02-95	175	900	20.7	6.78	8.40	54.4	153.9	652	0.00	0.00	0.061	0.00015
02-03-95	176	930	26.2	6.84	3.58							
02-04-95	177	1000	18.6	6.95	10.33							
02-05-95	178	1200	25.2	6.83	4.25							
02-06-95	179	930	21.9	7.49	8.42							
02-07-95	180	900	22.6	7.49	8.45							
02-08-95	181	900	22.2	7.42	8.73							
02-09-95	182	900	21.4	7.39	9.45	47.6	85.5	248	0.00	0.00	0.015	0.00016
02-10-95	183	900	22.2	7.34	8.93							
02-11-95	184	900	21.7	7.22	9.47							
02-12-95	185	1200	21.5	7.06	9.64							
02-13-95	186	900	21.3	7.21	9.65							
02-14-95	187	900	21.3	7.21	9.54							
02-15-95	188	900	21.6	7.27	9.50							
02-16-95	189	900	21.5	7.18	9.63	40.8	85.5	244	0.00	0.00	0.034	0.00023
02-17-95	190	900	22.7	7.20	9.44							
02-18-95	191	1100	23.2	7.09	9.85							
02-19-95	192	1400	23.5	7.08	9.56							
02-20-95	193	1000	23.3	7.15	9.25							
02-21-95	194	1000	23.6	7.21	9.32							
02-22-95	195	900	23.7	7.23	9.12							
02-23-95	196	1000	24.4	7.19	9.09	34.0	85.5	250	0.00	0.00	0.046	0.00040
02-24-95	197	1000	24.0	7.22	8.94							
02-25-95	198	1000	24.1	7.22	9.04							
02-26-95	199	1800	24.1	7.16	9.20							
02-27-95	200	900	24.2	7.25	8.96							
02-28-95	201	900	24.5	7.22	8.90							
03-01-95	202	900	24.3	7.15	8.81							
03-02-95	203	900	24.4	7.21	8.78	34.0	85.5	347	0.00	0.00	0.020	0.00017
03-03-95	204	900	24.1	7.20	8.81							
03-04-95	205	1000	22.3	7.16	8.95							
03-05-95	206	1015	22.3	7.13	9.03							
03-06-95	207	900	22.3	7.18	9.05							
03-07-95	208	900	22.4	7.16	8.94							

03-08-95	209	900	22.1	7.24	8.78							
03-09-95	210	1000	22.5	7.22	8.84	40.8	85.5	239	0.00	0.00	0.024	0.00019
03-10-95	211	900	24.0	7.12	8.55							
03-11-95	212	1100	23.7	7.19	8.87							
03-12-95	213	1800	24.3	7.12	8.61							
03-13-95	214	900	23.3	7.18	8.70							
03-14-95	215	900	23.4	7.20	8.86							
03-15-95	216	900	22.8	7.22	8.84							
03-16-95	217	900	24.5	7.15	8.82	47.6	85.5	212	0.00	0.00	0.015	0.00011
03-17-95	218	900	24.7	7.21	8.53							
03-18-95	219	1000	24.7	7.27	8.28							
03-19-95	220	1600	25.5	7.18	8.34							
03-20-95	221	900	24.4	7.16	8.43							
03-21-95	222	900	25.0	7.23	8.32							
03-22-95	223	900	24.8	7.19	8.61							
03-23-95	224	1100	24.8	7.19	8.24	47.6	85.5	232	0.00	0.00	a	a
03-24-95	225	900	24.6	7.22	7.63							
03-25-95	226	915	24.8	7.09	8.00							
03-26-95	227	900	24.7	7.07	8.74							
03-27-95	228	900	24.9	7.18	8.22							
03-28-95	229	900	24.8	7.24	7.87							
03-29-95	230	900	24.6	7.21	8.00							
03-30-95	231	900	24.7	7.30	7.74	47.6	85.5	217	0.00	0.00	0.043	0.00039
03-31-95	232	900	24.5	7.22	7.66							
04-01-95	233	900	24.4	7.12	8.07							
04-02-95	234	1000	24.6	7.06	8.57							
04-03-95	235	900	24.2	7.23	8.29							
04-04-95	236	900	24.8	7.30	8.05							
04-05-95	237	900	23.5	7.28	8.03							
04-06-95	238	900	24.3	7.29	8.17	40.8	85.5	226	0.00	0.00	0.047	0.00035
04-07-95	239	900	24.6	7.30	8.03							
04-08-95	240	1100	25.0	7.27	8.08							
04-09-95	241	1300	25.5	7.24	8.49							
04-10-95	242	900	25.0	7.23	7.48							
04-11-95	243	900	25.2	7.30	7.55							
04-12-95	244	900	25.5	7.25	7.32							
04-13-95	245	1100	25.3	7.29	7.32	40.8	85.5	246	0.00	0.00	0.046	0.00038
04-14-95	246	900	25.0	7.15	7.03							
04-15-95	247	1400	25.4	7.28	7.91							
04-16-95	248	1100	24.5	7.21	7.86							
04-17-95	249	900	24.3	7.29	7.75							
04-18-95	250	900	24.3	7.34	7.86							
04-19-95	251	900	24.7	7.33	8.01							
04-20-95	252	900	24.9	7.32	7.77	40.8	68.4	217	0.00	0.00	a	a

04-21-95	253	900	25.1	7.36	7.47							
04-22-95	254	1200	25.4	7.28	7.56							
04-23-95	255	2000	25.4	7.28	7.68							
04-24-95	256	900	24.5	7.38	7.50							
04-25-95	257	900	24.5	7.30	7.42							
04-26-95	258	900	24.2	7.34	7.34							
04-27-95	259	900	25.0	7.32	7.31	40.8	85.5	221	0.00	0.00	a	a
04-28-95	260	900	25.2	7.27	7.37							
04-29-95	261	1100	25.1	7.30	7.02							
04-30-95	262	1600	24.8	7.31	7.68							
05-01-95	263	900	25.1	7.34	7.96							
05-02-95	264	900	25.0	7.34	8.45							
05-03-95	265	900	24.9	7.35	7.43							
05-04-95	266	900	24.8	7.35	7.79	40.8	85.5	222	0.00	0.00	a	a
05-05-95	267	900	25.1	7.33	7.68							
05-06-95	268	830	25.1	7.05	7.47							
05-07-95	269	900	25.0	7.07	7.38							
05-08-95	270	900	25.0	7.20	7.75							
05-09-95	271	900	25.0	7.21	7.48							
05-10-95	272	900	25.6	7.20	7.43							
MEAN			23.6		7.55	51.0	152.1				0.081	0.00032
MINIMUM			18.6	6.33	2.74	34.0	68.4	212	0.00	0.00	0.015	0.00004
MAXIMUM			31.2	7.77	10.43	74.8	547.2	>1999	0.00	0.00	0.693	0.00287
Std Dev			1.82		1.394	11.22	116.30				0.1223	0.000499
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 6
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.00	7.00							
08-13-94	2	900	25.3	6.92	5.88							
08-14-94	3	900	25.2	7.02	5.74							
08-15-94	4	900	24.1	6.82	5.84							
08-16-94	5	1000	24.1	6.94	6.09							
08-17-94	6	1000	25.1	7.11	5.07							
08-18-94	7	900	24.9	6.87	4.79	47.6	85.5	913	0.00	0.00	0.518	0.00216
08-19-94	8	800	24.4	6.80	5.56							
08-20-94	9	1000	25.1	6.84	6.14							
08-21-94	10	800	25.5	6.86	5.87							
08-22-94	11	900	24.3	6.81	5.66							
08-23-94	12	730	24.2	6.83	5.64							
08-24-94	13	1000	24.0	6.68	6.66							
08-25-94	14	1100	23.8	6.82	6.54	54.4	119.7	741	0.00	0.00	0.148	0.00051
08-26-94	15	900	24.2	6.77	6.07							
08-27-94	16	900	24.0	6.82	5.79							
08-28-94	17	800	24.5	6.92	5.77							
08-29-94	18	900	25.3	6.88	5.16							
08-30-94	19	900	22.6	6.78	5.57							
08-31-94	20	800	24.4	7.06	6.52							
09-01-94	21	1100	24.6	6.88	6.38	68.0	136.8	545	0.00	0.00	a	a
09-02-94	22	900	23.8	6.78	5.87							
09-03-94	23	815	24.5	7.02	6.11							
09-04-94	24	810	24.2	7.05	5.86							
09-05-94	25	1100	24.6	6.83	6.50							
09-06-94	26	900	24.6	6.83	6.52							
09-07-94	27	800	24.1	6.86	6.80							
09-08-94	28	1100	24.0	6.90	6.60	68.0	136.8	598	0.00	0.00	0.048	0.00020
09-09-94	29	900	23.9	6.91	7.05							
09-10-94	30	900	24.3	6.89	6.33							
09-11-94	31	800	23.1	6.90	6.24							
09-12-94	32	500	24.0	7.09	6.46							

09-13-94	33	700	24.1	6.98	6.66							
09-14-94	34	1400	26.7	6.98	4.31							
09-15-94	35	1300	26.3	7.10	4.85							
09-16-94	36	1200	25.6	6.65	5.37	40.8	119.7	850	0.00	0.00	0.072	0.00019
09-17-94	37	820	25.6	6.80	5.38							
09-18-94	38	830	25.6	6.83	4.90							
09-19-94	39	1000	24.4	6.95	5.43							
09-20-94	40	1000	23.9	6.89	5.46							
09-21-94	41	1000	25.6	6.90	5.61							
09-22-94	42	900	24.4	6.88	5.86	68.0	136.8	707	0.00	0.00	a	a
09-23-94	43	1000	24.2	6.77	6.54							
09-24-94	44	845	24.1	6.77	6.15							
09-25-94	45	1300	25.2	a	5.80							
09-26-94	46	900	26.3	6.78	3.92							
09-27-94	47	800	25.1	6.70	5.85							
09-28-94	48	1000	24.3	6.73	5.82	47.6	119.7	925	a	a	a	a
09-29-94	49	1030	26.1	6.89	2.82							
09-30-94	50	1030	22.6	6.86	7.06							
10-01-94	51	900	23.1	7.01	6.53							
10-02-94	52	915	22.9	6.88	6.37							
10-03-94	53	1100	21.9	6.84	6.63							
10-04-94	54	1100	22.6	6.86	6.83							
10-05-94	55	1000	23.6	6.88	6.76							
10-06-94	56	800	22.5	6.95	7.25	74.8	136.8	780	0.00	0.00	a	a
10-07-94	57	1100	23.6	6.92	7.67						0.033	0.00014
10-08-94	58	1100	24.3	6.91	7.53							
10-09-94	59	1100	26.8	6.85	5.83							
10-10-94	60	1000	24.5	6.82	5.88							
10-11-94	61	1600	25.4	6.92	3.61							
10-12-94	62	900	21.9	6.94	7.78							
10-13-94	63	1300	23.8	6.84	7.3	54.4	307.8	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.2	6.78	6.44							
10-15-94	65	900	24.1	6.88	6.80							
10-16-94	66	900	23.5	6.69	7.51							
10-17-94	67	1000	23.0	6.83	7.58							
10-18-94	68	800	23.5	6.62	7.08							
10-19-94	69	900	24.3	6.71	7.37							
10-20-94	70	900	23.6	6.62	6.22	34.0	495.9	>1999	0.00	0.00	0.033	0.00007
10-21-94	71	900	21.7	6.72	6.98							
10-22-94	72	800	22.2	6.78	6.75							
10-23-94	73	900	23.0	6.71	6.82							
10-24-94	74	900	21.5	6.69	6.29							
10-25-94	75	900	22.1	6.70	6.46							
10-26-94	76	800	21.2	6.78	7.16							

10-27-94	77	1100	20.7	6.77	7.71	61.2	153.9	837	0.00	0.00	0.088	0.00022
10-28-94	78	1000	20.3	6.84	7.93							
10-29-94	79	900	20.6	6.90	7.94							
10-30-94	80	900	21.1	6.85	7.85							
10-31-94	81	1000	22.2	6.80	7.21							
11-01-94	82	1100	25.1	6.76	5.57							
11-02-94	83	1000	21.7	6.77	7.22							
11-03-94	84	1000	21.2	6.74	6.83							
11-04-94	85	1000	21.9	6.81	6.64	68.0	171.0	962	0.00	0.00	0.200	0.00059
11-05-94	86	1000	22.5	6.83	7.72							
11-06-94	87	1000	24.2	6.79	6.80							
11-07-94	88	700	21.8	6.76	7.54							
11-08-94	89	1000	20.5	6.85	8.38							
11-09-94	90	1000	21.9	6.74	7.58							
11-10-94	91	1100	22.1	6.86	6.92							
11-11-94	92	900	19.0	6.79	7.92	54.4	171.0	894	0.00	0.00	0.084	0.00019
11-12-94	93	845	18.5	6.74	8.19							
11-13-94	94	830	20.9	6.85	8.05							
11-14-94	95	1000	21.4	6.73	7.42							
11-15-94	96	900	21.9	6.74	7.23							
11-16-94	97	900	21.7	6.79	6.73	54.4	136.8	1134	0.00	0.00	0.047	0.00013
11-17-94	98	900	21.2	6.85	7.35							
11-18-94	99	900	24.5	6.73	7.16							
11-19-94	100	800	23.0	6.72	6.77							
11-20-94	101	900	22.8	6.78	7.14							
11-21-94	102	600	22.1	6.78	7.38							
11-22-94	103	600	23.7	6.80	7.16							
11-23-94	104	800	19.1	6.77	8.81	54.4	119.7	>1999	0.00	0.00	0.082	0.00018
11-24-94	105	730	22.9	6.77	8.61							
11-25-94	106	1020	22.6	7.13	9.60							
11-26-94	107	1000	20.2	6.75	10.33							
11-27-94	108	900	20.0	6.69	9.32							
11-28-94	109	900	22.0	6.72	9.01							
11-29-94	110	900	21.2	6.68	8.67							
11-30-94	111	900	21.3	6.63	8.52							
12-01-94	112	900	21.0	6.62	8.78	47.6	102.6	414	0.00	0.00	0.110	0.00020
12-02-94	113	1000	21.3	6.71	9.30							
12-03-94	114	1000	20.7	6.72	8.65							
12-04-94	115	1100	22.4	6.68	7.98							
12-05-94	116	900	24.5	6.71	7.16							
12-06-94	117	900	22.9	6.81	7.48							
12-07-94	118	800	22.5	6.80	8.21							
12-08-94	119	1100	25.9	6.80	5.94	54.4	102.6	449	0.00	0.00	0.083	0.00032
12-09-94	120	1000	22.2	6.85	7.46							

12-10-94	121	1300	22.4	6.84	8.06							
12-11-94	122	900	31.1	6.68	2.75							
12-12-94	123	900	24.3	7.66	8.21							
12-13-94	124	900	24.3	7.69	8.49							
12-14-94	125	900	24.3	7.67	8.62							
12-15-94	126	800	20.6	6.86	9.82	47.6	444.6	>1999	0.00	0.00	0.086	0.00026
12-16-94	127	1100	21.9	6.77	8.78							
12-17-94	128	845	22.4	6.74	8.59							
12-18-94	129	930	22.4	6.73	7.90							
12-19-94	130	1000	22.3	6.71	7.86							
12-20-94	131	1100	22.2	6.80	8.27							
12-21-94	132	1000	18.9	6.77	9.70	54.4	256.5	1964	0.00	0.00	0.100	0.00022
12-22-94	133	800	27.9	7.05	6.31							
12-23-94	134	1000	28.0	6.82	5.21							
12-24-94	135	900	28.0	7.08	6.60							
12-25-94	136	700	24.8	7.78	8.25							
12-26-94	137	1000	25.3	7.72	7.96							
12-27-94	138	1100	20.7	6.82	8.83							
12-28-94	139	1000	20.6	6.80	9.65							
12-29-94	140	900	19.9	6.70	8.62	54.4	205.2	1164	0.00	0.00	0.074	0.00015
12-30-94	141	1000	27.6	6.87	6.71							
12-31-94	142	1000	28.2	6.98	2.77							
01-01-95	143	1100	21.2	6.80	8.68							
01-02-95	144	1000	20.9	6.81	8.48							
01-03-95	145	1100	22.0	6.80	7.56							
01-04-95	146	900	19.3	6.90	9.50							
01-05-95	147	1100	26.3	7.19	4.68	74.8	102.6	543	0.00	0.00	0.029	0.00028
01-06-95	148	1000	23.5	7.58	8.37							
01-07-95	149	1130	24.5	7.66	8.98							
01-08-95	150	1030	24.3	7.63	8.59							
01-09-95	151	1000	24.2	7.63	9.12							
01-10-95	152	1000	20.1	6.70	9.56							
01-11-95	153	1000	20.5	6.85	8.78							
01-12-95	154	1100	21.0	6.68	8.12	47.6	119.9	433	0.00	0.00	0.018	0.00004
01-13-95	155	1000	21.4	6.73	7.96							
01-14-95	156	900	22.4	6.71	7.42							
01-15-95	157	800	25.4	6.85	6.60							
01-16-95	158	1030	24.0	6.83	6.82							
01-17-95	159	1000	23.6	6.82	7.95							
01-18-95	160	1000	23.7	7.00	6.75							
01-19-95	161	1000	23.4	7.10	8.04	61.2	530.1	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.9	6.87	7.72							
01-21-95	163	1000	23.7	6.75	7.05							
01-22-95	164	1100	22.6	6.90	7.92							

01-23-95	165	600	20.8	6.86	9.18							
01-24-95	166	1000	22.1	6.79	9.33							
01-25-95	167	1100	24.5	6.80	6.13							
01-26-95	168	1000	20.8	6.78	8.37	47.6	102.6	344	0.00	0.00	0.019	0.00005
01-27-95	169	1000	19.3	6.72	9.27							
01-28-95	170	830	20.2	6.74	8.64							
01-29-95	171	900	23.0	6.78	8.41							
01-30-95	172	1000	19.9	6.83	9.33							
01-31-95	173	1000	20.8	7.62	8.63							
02-01-95	174	1000	19.3	6.93	9.57							
02-02-95	175	900	20.3	6.78	8.59	54.4	153.9	657	0.00	0.00	0.057	0.00014
02-03-95	176	930	26.0	6.84	3.66							
02-04-95	177	1000	18.7	6.95	10.38							
02-05-95	178	1200	25.2	6.83	4.23							
02-06-95	179	930	21.9	7.49	8.39							
02-07-95	180	900	22.6	7.49	8.50							
02-08-95	181	900	22.4	7.42	8.87							
02-09-95	182	900	21.7	7.39	9.32	47.6	85.5	248	0.00	0.00	0.017	0.00019
02-10-95	183	900	22.2	7.34	8.86							
02-11-95	184	900	21.7	7.22	9.42							
02-12-95	185	1200	21.5	7.06	9.68							
02-13-95	186	900	21.3	7.21	9.59							
02-14-95	187	900	21.4	7.21	9.52							
02-15-95	188	900	21.3	7.27	9.72							
02-16-95	189	900	21.6	7.18	9.77	40.8	85.5	244	0.00	0.00	0.031	0.00021
02-17-95	190	900	23.0	7.20	9.42							
02-18-95	191	1100	23.4	7.09	9.88							
02-19-95	192	1400	23.8	7.06	9.58							
02-20-95	193	1000	23.7	7.15	9.30							
02-21-95	194	1000	23.7	7.21	9.28							
02-22-95	195	900	23.8	7.23	9.16							
02-23-95	196	1000	24.7	7.19	9.05	34.0	85.5	251	0.00	0.00	0.050	0.00040
02-24-95	197	1000	24.3	7.22	8.87							
02-25-95	198	1000	24.3	7.22	9.06							
02-26-95	199	1800	24.4	7.16	9.05							
02-27-95	200	900	24.4	7.25	8.93							
02-28-95	201	900	24.7	7.22	8.89							
03-01-95	202	900	24.7	7.15	8.78							
03-02-95	203	900	24.4	7.21	8.83	34.0	85.5	347	0.00	0.00	0.020	0.00017
03-03-95	204	900	24.2	7.20	8.78							
03-04-95	205	1000	22.5	7.16	8.97							
03-05-95	206	1015	22.5	7.09	9.01							
03-06-95	207	900	22.6	7.18	9.01							
03-07-95	208	900	22.7	7.16	8.83							

03-08-95	209	900	22.5	7.24	8.73							
03-09-95	210	1000	23.0	7.22	8.61	40.8	85.5	241	0.00	0.00	0.023	0.00019
03-10-95	211	900	24.5	7.12	8.40							
03-11-95	212	1100	23.9	7.19	8.67							
03-12-95	213	1800	24.9	7.12	8.40							
03-13-95	214	900	23.9	7.18	8.52							
03-14-95	215	900	24.0	7.20	8.77							
03-15-95	216	900	23.0	7.22	8.80							
03-16-95	217	900	24.7	7.15	8.80	47.6	85.5	213	0.00	0.00	0.015	0.00011
03-17-95	218	900	24.9	7.21	8.64							
03-18-95	219	1000	25.0	7.27	8.31							
03-19-95	220	1600	25.7	7.18	8.30							
03-20-95	221	900	24.5	7.16	8.41							
03-21-95	222	900	25.0	7.23	8.30							
03-22-95	223	900	24.9	7.19	8.62							
03-23-95	224	1100	25.0	7.19	8.22	47.6	85.5	233	0.00	0.00	a	a
03-24-95	225	900	24.8	7.22	7.56							
03-25-95	226	915	25.0	7.10	8.04							
03-26-95	227	900	24.8	7.09	8.65							
03-27-95	228	900	25.0	7.18	8.19							
03-28-95	229	900	24.9	7.24	7.75							
03-29-95	230	900	24.7	7.21	7.91							
03-30-95	231	900	24.9	7.30	7.74	47.6	85.5	218	0.00	0.00	0.051	0.00046
03-31-95	232	900	24.6	7.22	7.74							
04-01-95	233	900	24.6	7.13	8.05							
04-02-95	234	1000	24.6	7.11	8.47							
04-03-95	235	900	24.3	7.23	8.25							
04-04-95	236	900	24.9	7.30	7.86							
04-05-95	237	900	23.6	7.28	7.95							
04-06-95	238	900	24.5	7.29	8.02	40.8	85.5	226	0.00	0.00	0.049	0.00037
04-07-95	239	900	24.8	7.30	7.80							
04-08-95	240	1100	25.1	7.27	8.09							
04-09-95	241	1300	25.5	7.24	8.36							
04-10-95	242	900	25.2	7.23	7.50							
04-11-95	243	900	25.4	7.30	7.60							
04-12-95	244	900	25.9	7.25	7.35							
04-13-95	245	1100	25.6	7.29	7.27	40.8	85.5	246	0.00	0.00	0.044	0.00036
04-14-95	246	900	25.3	7.15	7.10							
04-15-95	247	1400	25.7	7.28	7.68							
04-16-95	248	1100	24.8	7.21	7.63							
04-17-95	249	900	24.6	7.29	7.66							
04-18-95	250	900	24.6	7.34	7.83							
04-19-95	251	900	25.0	7.33	7.95							
04-20-95	252	900	25.1	7.32	7.66	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.3	7.36	7.46							
04-22-95	254	1200	25.6	7.28	7.43							
04-23-95	255	2000	25.6	7.28	7.56							
04-24-95	256	900	24.7	7.38	7.44							
04-25-95	257	900	24.8	7.30	7.13							
04-26-95	258	900	24.5	7.34	7.21							
04-27-95	259	900	25.3	7.32	7.20	40.8	85.5	221	0.00	0.00	a	a
04-28-95	260	900	25.4	7.27	7.20							
04-29-95	261	1100	25.3	7.30	6.92							
04-30-95	262	1600	24.8	7.31	7.50							
05-01-95	263	900	25.4	7.34	7.86							
05-02-95	264	900	25.3	7.34	8.18							
05-03-95	265	900	25.2	7.35	7.29							
05-04-95	266	900	25.0	7.35	7.62	40.8	85.5	223	0.00	0.00	a	a
05-05-95	267	900	25.3	7.33	7.62							
05-06-95	268	830	25.2	7.06	7.27							
05-07-95	269	900	25.2	7.06	7.33							
05-08-95	270	900	25.2	7.20	7.56							
05-09-95	271	900	25.2	7.21	7.34							
05-10-95	272	900	25.8	7.20	7.37							
MEAN			23.6		7.52	51.0	151.7				0.077	0.00030
MINIMUM			18.5	6.62	2.75	34.0	68.4	213	0.00	0.00	0.015	0.00004
MAXIMUM			31.1	7.78	10.380	74.8	530.1	>1999	0.00	0.00	0.518	0.00216
Std Dev			1.91		1.385	10.78	110.76				0.0930	0.000375
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 7
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OFCANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.7	7.00	6.46							
08-13-94	2	900	25.3	6.89	5.53							
08-14-94	3	900	25.3	7.01	5.32							
08-15-94	4	900	24.1	6.83	5.34							
08-16-94	5	1000	24.0	6.96	5.79							
08-17-94	6	1000	25.1	7.08	4.03							
08-18-94	7	900	24.8	6.77	3.76	47.6	68.4	896	0.00	0.00	0.526	0.00173
08-19-94	8	800	24.5	6.78	4.97							
08-20-94	9	1000	25.2	6.84	5.73							
08-21-94	10	800	25.5	6.87	5.44							
08-22-94	11	900	24.4	6.77	5.02							
08-23-94	12	730	22.9	6.81	6.07							
08-24-94	13	1000	24.0	6.68	6.24							
08-25-94	14	1100	23.8	6.80	6.04	54.4	102.6	742	0.00	0.00	0.150	0.00049
08-26-94	15	900	24.2	6.77	5.60							
08-27-94	16	900	24.1	6.82	5.27							
08-28-94	17	800	24.6	6.90	5.39							
08-29-94	18	900	25.3	6.88	4.75							
08-30-94	19	900	22.7	6.76	5.11							
08-31-94	20	800	24.3	7.06	6.15							
09-01-94	21	1100	24.6	6.88	5.80	68.0	136.8	547	0.00	0.00	a	a
09-02-94	22	900	23.6	6.78	5.31							
09-03-94	23	815	24.5	7.01	5.75							
09-04-94	24	810	24.1	7.04	5.82							
09-05-94	25	1100	24.4	6.83	6.20							
09-06-94	26	900	24.4	6.83	6.22							
09-07-94	27	800	24.0	6.86	6.39							
09-08-94	28	1100	23.9	6.90	6.23	68.0	136.8	598	0.00	0.00	0.033	0.00014
09-09-94	29	900	23.8	6.91	6.71							
09-10-94	30	900	24.2	6.89	6.09							
09-11-94	31	800	22.9	6.90	5.96							
09-12-94	32	500	23.8	7.09	6.34							

09-13-94	33	700	23.9	6.98	6.55							
09-14-94	34	1400	26.7	6.98	4.22							
09-15-94	35	1300	26.3	7.10	4.28							
09-16-94	36	1200	25.5	6.70	4.94	40.8	119.7	842	0.00	0.00	0.056	0.00016
09-17-94	37	820	25.4	6.80	5.11							
09-18-94	38	830	25.6	6.82	4.52							
09-19-94	39	1000	24.3	6.95	5.20							
09-20-94	40	1000	23.7	6.89	5.10							
09-21-94	41	1000	25.4	6.90	5.31							
09-22-94	42	900	24.2	6.88	5.56	68.0	119.7	705	0.00	0.00	a	a
09-23-94	43	1000	24.0	6.77	6.35							
09-24-94	44	845	23.8	6.76	5.96							
09-25-94	45	1300	25.2	a	5.82							
09-26-94	46	900	26.3	6.78	3.99							
09-27-94	47	800	25.1	6.68	5.45							
09-28-94	48	1000	24.2	6.71	5.33	47.6	119.7	919	0.00	0.00	a	a
09-29-94	49	1030	26.0	6.87	2.79							
09-30-94	50	1030	22.5	6.80	6.66							
10-01-94	51	900	23.2	6.98	6.38							
10-02-94	52	915	22.9	6.84	5.78							
10-03-94	53	1100	21.7	6.82	6.29							
10-04-94	54	1100	22.5	6.83	6.46							
10-05-94	55	1000	23.6	6.86	6.30							
10-06-94	56	800	22.3	6.92	6.89	74.8	136.8	778	0.00	0.00	a	a
10-07-94	57	1100	23.3	6.88	7.20						0.036	0.00014
10-08-94	58	1100	24.0	6.88	7.14							
10-09-94	59	1100	26.6	6.82	5.43							
10-10-94	60	1000	24.2	6.80	5.34							
10-11-94	61	1600	25.3	7.00	6.34							
10-12-94	62	900	21.5	6.94	7.96							
10-13-94	63	1300	23.4	6.83	7.04	54.4	307.8	>1999	0.00	0.00	a	a
10-14-94	64	1300	23.7	6.76	6.07							
10-15-94	65	900	23.6	6.88	6.30							
10-16-94	66	900	22.9	6.68	7.19							
10-17-94	67	1000	22.3	6.83	7.08							
10-18-94	68	800	22.8	6.61	6.61							
10-19-94	69	900	23.7	6.71	7.10							
10-20-94	70	900	23.6	6.62	6.06	40.8	530.1	>1999	0.00	0.00	0.033	0.00007
10-21-94	71	900	21.5	6.73	6.93							
10-22-94	72	800	22.0	6.78	6.67							
10-23-94	73	900	23.0	6.71	6.75							
10-24-94	74	900	21.5	6.69	6.19							
10-25-94	75	900	22.1	6.70	6.48							
10-26-94	76	800	21.3	6.78	7.31							

10-27-94	77	1100	20.8	6.78	7.81	54.4	171.0	845	0.00	0.00	0.081	0.00020
10-28-94	78	1000	20.4	6.85	8.08							
10-29-94	79	900	20.7	6.90	8.04							
10-30-94	80	900	21.3	6.85	7.97							
10-31-94	81	1000	22.3	6.80	7.32							
11-01-94	82	1100	25.0	6.76	5.82							
11-02-94	83	1000	21.9	6.77	7.22							
11-03-94	84	1000	21.1	6.76	6.94							
11-04-94	85	1000	21.9	6.82	6.76	68.0	171.0	962	0.00	0.00	0.190	0.00057
11-05-94	86	1000	22.5	6.85	7.81							
11-06-94	87	1000	24.1	6.79	6.91							
11-07-94	88	700	21.8	6.76	7.61							
11-08-94	89	1000	20.4	6.85	8.57							
11-09-94	90	1000	21.8	6.74	7.81							
11-10-94	91	1100	22.0	6.86	7.16							
11-11-94	92	900	19.0	6.79	7.94	54.4	171.0	930	0.00	0.00	0.065	0.00015
11-12-94	93	845	18.0	6.73	8.28							
11-13-94	94	830	20.7	6.84	8.12							
11-14-94	95	1000	21.4	6.73	7.45							
11-15-94	96	900	21.9	6.74	7.29							
11-16-94	97	900	21.6	6.79	6.72	54.4	136.8	1111	0.00	0.00	0.044	0.00012
11-17-94	98	900	21.1	6.85	7.30							
11-18-94	99	900	24.4	6.73	7.17							
11-19-94	100	800	23.0	6.72	6.61							
11-20-94	101	900	22.7	6.78	7.02							
11-21-94	102	600	21.8	6.78	7.33							
11-22-94	103	600	23.5	6.80	7.10							
11-23-94	104	800	18.7	6.77	8.64	54.4	119.7	>1999	0.00	0.00	0.083	0.00018
11-24-94	105	730	22.6	6.78	8.76							
11-25-94	106	1020	22.5	7.14	9.58							
11-26-94	107	1000	19.8	6.75	10.65							
11-27-94	108	900	19.7	6.69	9.29							
11-28-94	109	900	21.6	6.72	9.13							
11-29-94	110	900	20.8	6.68	8.66							
11-30-94	111	900	20.9	6.63	8.48							
12-01-94	112	900	20.5	6.62	8.73	47.6	102.6	411	0.00	0.00	0.110	0.00019
12-02-94	113	1000	20.7	6.72	9.32							
12-03-94	114	1000	20.5	6.72	8.61							
12-04-94	115	1100	21.9	6.69	7.92							
12-05-94	116	900	24.1	6.71	7.17							
12-06-94	117	900	22.7	6.81	7.39							
12-07-94	118	800	22.2	6.80	8.00							
12-08-94	119	1100	25.8	6.80	6.03	54.4	102.6	447	0.00	0.00	0.090	0.00034
12-09-94	120	1000	21.9	6.85	7.43							

12-10-94	121	1300	22.0	6.84	7.95							
12-11-94	122	900	31.0	6.68	3.01							
12-12-94	123	900	24.3	7.66	8.29							
12-13-94	124	900	24.2	7.70	8.79							
12-14-94	125	900	24.2	7.67	8.84							
12-15-94	126	800	20.2	6.86	9.85	47.6	427.5	>1999	0.00	0.00	0.078	0.00023
12-16-94	127	1100	21.1	6.77	8.79							
12-17-94	128	845	21.2	6.74	8.63							
12-18-94	129	930	21.2	6.73	7.78							
12-19-94	130	1000	21.8	6.71	7.73							
12-20-94	131	1100	21.4	6.80	8.18							
12-21-94	132	1000	18.2	6.77	9.61	54.4	256.5	1938	0.00	0.00	0.100	0.00020
12-22-94	133	800	27.5	7.05	6.77							
12-23-94	134	1000	27.9	6.82	5.60							
12-24-94	135	900	27.5	7.08	7.04							
12-25-94	136	700	24.5	7.80	8.40							
12-26-94	137	1000	25.0	7.72	8.25							
12-27-94	138	1100	20.2	6.82	8.82							
12-28-94	139	1000	20.0	6.80	9.62							
12-29-94	140	900	19.4	6.70	8.60	54.4	205.2	1152	0.00	0.00	0.071	0.00013
12-30-94	141	1000	26.9	6.87	7.04							
12-31-94	142	1000	27.9	6.98	3.28							
01-01-95	143	1100	20.6	6.80	8.85							
01-02-95	144	1000	20.3	6.81	8.45							
01-03-95	145	1100	21.6	6.80	7.77							
01-04-95	146	900	18.0	6.90	9.63							
01-05-95	147	1100	26.0	7.19	4.99	74.8	102.6	541	0.00	0.00	0.030	0.00028
01-06-95	148	1000	22.9	7.60	8.75							
01-07-95	149	1130	24.1	7.69	9.16							
01-08-95	150	1030	23.7	7.66	9.11							
01-09-95	151	1000	23.5	7.67	9.57							
01-10-95	152	1000	19.0	6.70	9.27							
01-11-95	153	1000	19.1	6.85	8.97							
01-12-95	154	1100	19.6	6.68	8.52	47.6	102.6	424	0.00	0.00	0.018	0.00003
01-13-95	155	1000	20.3	6.69	8.28							
01-14-95	156	900	22.1	6.71	7.24							
01-15-95	157	800	24.6	6.85	6.48							
01-16-95	158	1030	23.3	6.83	6.67							
01-17-95	159	1000	22.4	6.82	7.97							
01-18-95	160	1000	22.9	7.00	6.77							
01-19-95	161	1000	22.5	7.10	8.04	61.2	513.0	>1999	0.00	0.00	a	a
01-20-95	162	1000	22.9	6.87	7.75							
01-21-95	163	1000	23.1	6.75	6.84							
01-22-95	164	1100	22.0	6.89	7.72							

01-23-95	165	600	20.1	6.86	9.00							
01-24-95	166	1000	21.5	6.79	9.31							
01-25-95	167	1100	24.3	6.80	6.00							
01-26-95	168	1000	20.1	6.78	8.45	47.6	102.6	340	0.00	0.00	0.020	0.00005
01-27-95	169	1000	18.2	6.68	9.29							
01-28-95	170	830	19.1	6.76	8.63							
01-29-95	171	900	22.1	6.78	8.56							
01-30-95	172	1000	18.7	6.83	9.26							
01-31-95	173	1000	20.3	7.62	8.76							
02-01-95	174	1000	17.5	6.93	9.72							
02-02-95	175	900	19.0	6.78	8.64	54.4	153.9	641	0.00	0.00	0.054	0.00012
02-03-95	176	930	25.6	6.84	4.01							
02-04-95	177	1000	18.3	6.95	10.28							
02-05-95	178	1200	25.0	6.83	4.48							
02-06-95	179	930	21.8	7.49	8.58							
02-07-95	180	900	22.4	7.49	8.41							
02-08-95	181	900	22.2	7.45	9.00							
02-09-95	182	900	21.6	7.39	9.55	47.6	85.5	247	0.00	0.00	0.015	0.00016
02-10-95	183	900	21.7	7.34	9.12							
02-11-95	184	900	21.5	7.22	9.81							
02-12-95	185	1200	21.3	7.06	10.03							
02-13-95	186	900	21.2	7.21	9.97							
02-14-95	187	900	21.1	7.21	9.81							
02-15-95	188	900	21.3	7.27	9.78							
02-16-95	189	900	21.3	7.18	9.87	40.8	85.5	243	0.00	0.00	0.030	0.00020
02-17-95	190	900	22.9	7.20	9.41							
02-18-95	191	1100	23.1	7.09	9.96							
02-19-95	192	1400	23.5	7.06	9.71							
02-20-95	193	1000	23.3	7.15	9.47							
02-21-95	194	1000	23.5	7.21	9.36							
02-22-95	195	900	23.6	7.23	9.33							
02-23-95	196	1000	24.3	7.19	9.50	34.0	85.5	249	0.00	0.00	0.051	0.00040
02-24-95	197	1000	24.1	7.22	9.12							
02-25-95	198	1000	23.9	7.22	9.33							
02-26-95	199	1800	23.9	7.16	9.34							
02-27-95	200	900	24.0	7.25	9.18							
02-28-95	201	900	24.3	7.22	9.10							
03-01-95	202	900	24.3	7.15	9.25							
03-02-95	203	900	24.1	7.21	9.07	34.0	85.5	343	0.00	0.00	0.022	0.00018
03-03-95	204	900	24.0	7.20	8.94							
03-04-95	205	1000	23.0	7.16	9.04							
03-05-95	206	1015	22.8	7.12	9.14							
03-06-95	207	900	22.9	7.18	9.20							
03-07-95	208	900	23.1	7.16	9.04							

03-08-95	209	900	22.8	7.24	8.94							
03-09-95	210	1000	23.1	7.22	8.90	40.8	85.5	241	0.00	0.00	0.023	0.00019
03-10-95	211	900	24.2	7.12	8.60							
03-11-95	212	1100	24.0	7.19	8.79							
03-12-95	213	1800	24.7	7.12	8.55							
03-13-95	214	900	23.9	7.18	8.46							
03-14-95	215	900	24.0	7.20	8.77							
03-15-95	216	900	23.6	7.22	8.84							
03-16-95	217	900	25.0	7.15	8.79	47.6	85.5	217	0.00	0.00	0.015	0.00011
03-17-95	218	900	25.1	7.21	8.53							
03-18-95	219	1000	25.1	7.27	8.31							
03-19-95	220	1600	25.8	7.18	8.28							
03-20-95	221	900	24.7	7.16	8.42							
03-21-95	222	900	25.3	7.23	8.43							
03-22-95	223	900	25.0	7.19	8.72							
03-23-95	224	1100	25.0	7.19	8.22	47.6	85.5	236	0.00	0.00	a	a
03-24-95	225	900	24.9	7.22	7.48							
03-25-95	226	915	24.9	7.10	8.01							
03-26-95	227	900	24.9	7.12	8.67							
03-27-95	228	900	25.1	7.18	8.33							
03-28-95	229	900	23.8	7.24	8.64							
03-29-95	230	900	24.6	7.21	7.95							
03-30-95	231	900	25.0	7.30	7.52	47.6	85.5	222	0.00	0.00	0.056	0.05100
03-31-95	232	900	24.9	7.22	7.60							
04-01-95	233	900	24.9	7.14	7.98							
04-02-95	234	1000	25.0	7.08	8.55							
04-03-95	235	900	24.7	7.23	8.15							
04-04-95	236	900	25.2	7.30	8.01							
04-05-95	237	900	24.0	7.28	7.86							
04-06-95	238	900	24.8	7.29	8.01	40.8	85.5	231	0.00	0.00	0.051	0.00038
04-07-95	239	900	25.1	7.30	8.00							
04-08-95	240	1100	25.2	7.27	7.86							
04-09-95	241	1300	25.6	7.24	8.47							
04-10-95	242	900	25.4	7.23	7.34							
04-11-95	243	900	25.6	7.30	7.39							
04-12-95	244	900	25.7	7.25	7.36							
04-13-95	245	1100	25.6	7.29	7.15	40.8	85.5	249	0.00	0.00	0.039	0.00032
04-14-95	246	900	25.3	7.15	7.08							
04-15-95	247	1400	25.7	7.28	7.69							
04-16-95	248	1100	24.9	7.21	7.67							
04-17-95	249	900	24.7	7.29	7.66							
04-18-95	250	900	24.7	7.34	7.72							
04-19-95	251	900	25.1	7.33	7.83							
04-20-95	252	900	25.0	7.32	7.62	40.8	68.4	222	0.00	0.00	a	a

04-21-95	253	900	25.4	7.36	7.32							
04-22-95	254	1200	25.7	7.28	7.43							
04-23-95	255	2000	25.6	7.28	7.37							
04-24-95	256	900	24.7	7.38	7.30							
04-25-95	257	900	24.8	7.30	6.91							
04-26-95	258	900	24.3	7.34	7.29							
04-27-95	259	900	25.2	7.32	7.05	40.8	85.5	225	0.00	0.00	a	a
04-28-95	260	900	25.4	7.27	7.01							
04-29-95	261	1100	25.3	7.30	6.89							
04-30-95	262	1600	25.1	7.31	7.40							
05-01-95	263	900	25.4	7.34	7.74							
05-02-95	264	900	25.3	7.34	8.17							
05-03-95	265	900	25.2	7.35	7.25							
05-04-95	266	900	25.0	7.35	7.54	40.8	85.5	227	0.00	0.00	a	a
05-05-95	267	900	25.2	7.33	7.52							
05-06-95	268	830	25.2	7.04	7.31							
05-07-95	269	900	25.2	7.07	7.15							
05-08-95	270	900	25.2	7.20	7.54							
05-09-95	271	900	25.1	7.21	7.35							
05-10-95	272	900	25.8	7.20	7.38							
MEAN			23.4		7.48	51.0	150.3				0.075	0.00202
MINIMUM			17.5	6.61	2.79	34.0	68.4	217	0.00	0.00	0.015	0.00003
MAXIMUM			31.0	7.80	10.65	74.8	530.1	>1999	0.00	0.00	0.526	0.05100
			2.07		1.494	10.44	111.80				0.0942	0.009262
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 8
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.6	7.00	6.49							
08-13-94	2	900	25.2	6.89	5.57							
08-14-94	3	900	25.2	7.01	5.36							
08-15-94	4	900	24.1	6.83	5.35							
08-16-94	5	1000	24.1	6.96	5.85							
08-17-94	6	1000	25.1	7.07	5.00							
08-18-94	7	900	24.9	6.79	4.56	47.6	68.4	905	0.00	0.00	0.555	0.00193
08-19-94	8	800	24.4	6.78	4.94							
08-20-94	9	1000	25.2	6.85	5.75							
08-21-94	10	800	25.6	6.87	5.48							
08-22-94	11	900	24.4	6.77	5.06							
08-23-94	12	730	22.8	6.81	6.12							
08-24-94	13	1000	23.9	6.68	6.26							
08-25-94	14	1100	23.7	6.80	6.02	54.4	119.7	742	0.00	0.00	0.108	0.00035
08-26-94	15	900	24.1	6.77	5.52							
08-27-94	16	900	24.0	6.82	5.27							
08-28-94	17	800	24.5	6.90	5.39							
08-29-94	18	900	25.3	6.88	4.77							
08-30-94	19	900	22.5	6.76	5.09							
08-31-94	20	800	24.3	7.06	6.19							
09-01-94	21	1100	24.6	6.88	5.86	68.0	136.8	547	0.00	0.00	a	a
09-02-94	22	900	23.6	6.78	5.38							
09-03-94	23	815	24.5	7.01	5.93							
09-04-94	24	810	24.1	7.05	5.97							
09-05-94	25	1100	24.5	6.83	6.22							
09-06-94	26	900	24.4	6.83	6.22							
09-07-94	27	800	24.0	6.86	6.42							
09-08-94	28	1100	23.9	6.90	6.30	68.0	119.7	598	0.00	0.00	0.021	0.00009
09-09-94	29	900	23.8	6.91	6.78							
09-10-94	30	900	24.2	6.89	6.23							
09-11-94	31	800	23.0	6.90	6.00							
09-12-94	32	500	23.9	7.09	6.35							

09-13-94	33	700	24.0	6.98	6.52							
09-14-94	34	1400	26.7	6.98	4.27							
09-15-94	35	1300	26.3	7.10	5.20							
09-16-94	36	1200	25.5	6.70	4.98	40.8	136.8	848	0.00	0.00	0.066	0.00019
09-17-94	37	820	25.4	6.68	5.09							
09-18-94	38	830	25.5	6.80	4.70							
09-19-94	39	1000	24.3	6.95	5.26							
09-20-94	40	1000	23.8	6.89	5.24							
09-21-94	41	1000	25.4	6.90	5.25							
09-22-94	42	900	24.2	6.88	5.60	68.0	119.7	706	0.00	0.00	a	a
09-23-94	43	1000	24.0	6.77	6.37							
09-24-94	44	845	23.9	6.78	6.04							
09-25-94	45	1300	25.2	a	5.85							
09-26-94	46	900	26.3	6.78	3.99							
09-27-94	47	800	25.1	6.68	5.44							
09-28-94	48	1000	24.2	6.71	5.44	47.6	119.7	910	0.00	0.00	a	a
09-29-94	49	1030	26.1	6.87	2.84							
09-30-94	50	1030	22.5	6.81	6.88							
10-01-94	51	900	23.1	7.00	6.48							
10-02-94	52	915	22.8	6.86	6.01							
10-03-94	53	1100	21.7	6.82	6.35							
10-04-94	54	1100	22.5	6.83	6.61							
10-05-94	55	1000	23.5	6.86	6.53							
10-06-94	56	800	22.4	6.92	6.70	74.8	119.7	787	a	a	a	a
10-07-94	57	1100	23.3	6.88	7.36						0.033	0.00013
10-08-94	58	1100	24.0	6.88	7.23							
10-09-94	59	1100	26.6	6.82	5.60							
10-10-94	60	1000	24.2	6.80	5.45							
10-11-94	61	1600	25.3	7.00	5.30							
10-12-94	62	900	21.5	6.94	7.79							
10-13-94	63	1300	23.3	6.83	7.22	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	23.8	6.76	6.23							
10-15-94	65	900	23.8	6.88	6.49							
10-16-94	66	900	23.1	6.68	7.42							
10-17-94	67	1000	22.5	6.83	7.20							
10-18-94	68	800	23.1	6.61	6.78							
10-19-94	69	900	23.8	6.71	7.23							
10-20-94	70	900	23.3	6.62	6.16	40.8	547.2	>1999	0.00	0.00	0.028	0.00006
10-21-94	71	900	21.4	6.73	7.00							
10-22-94	72	800	21.8	6.78	6.67							
10-23-94	73	900	22.8	6.71	6.65							
10-24-94	74	900	21.2	6.69	6.15							
10-25-94	75	900	21.9	6.70	6.31							
10-26-94	76	800	20.8	6.78	7.36							

10-27-94	77	1100	20.4	6.80	7.91	61.2	171.0	845	0.00	0.00	0.086	0.00022
10-28-94	78	1000	20.0	6.85	8.11							
10-29-94	79	900	20.3	6.90	8.05							
10-30-94	80	900	20.8	6.85	8.01							
10-31-94	81	1000	21.9	6.80	7.30							
11-01-94	82	1100	24.8	6.76	5.55							
11-02-94	83	1000	21.5	6.77	7.16							
11-03-94	84	1000	20.8	6.76	6.94							
11-04-94	85	1000	21.6	6.82	6.68	68.0	171.0	962	0.00	0.00	0.200	0.00055
11-05-94	86	1000	22.3	6.85	7.72							
11-06-94	87	1000	24.0	6.79	6.80							
11-07-94	88	700	21.7	6.76	7.56							
11-08-94	89	1000	20.2	6.85	8.49							
11-09-94	90	1000	21.8	6.74	7.65							
11-10-94	91	1100	21.9	6.86	7.00							
11-11-94	92	900	18.9	6.79	7.75	54.4	188.1	971	0.00	0.00	0.062	0.00014
11-12-94	93	845	18.1	6.74	8.17							
11-13-94	94	830	20.8	6.81	8.14							
11-14-94	95	1000	21.2	6.73	7.19							
11-15-94	96	900	21.6	6.74	7.11							
11-16-94	97	900	21.4	6.79	6.56	54.4	153.9	1139	0.00	0.00	0.048	0.00013
11-17-94	98	900	20.7	6.85	7.17							
11-18-94	99	900	24.2	6.73	7.03							
11-19-94	100	800	22.8	6.72	6.53							
11-20-94	101	900	22.4	6.78	6.99							
11-21-94	102	600	21.8	6.78	7.23							
11-22-94	103	600	23.4	6.80	7.08							
11-23-94	104	800	18.8	6.77	8.57	54.4	119.7	>1999	0.00	0.00	0.086	0.00018
11-24-94	105	730	22.8	6.76	8.60							
11-25-94	106	1020	22.5	7.13	9.51							
11-26-94	107	1000	19.7	6.75	10.70							
11-27-94	108	900	19.5	6.69	9.22							
11-28-94	109	900	21.5	6.72	9.07							
11-29-94	110	900	20.8	6.68	8.60							
11-30-94	111	900	20.9	6.63	8.41							
12-01-94	112	900	20.3	6.62	8.68	47.6	102.6	408	0.00	0.00	0.110	0.00019
12-02-94	113	1000	20.7	6.72	9.32							
12-03-94	114	1000	20.5	6.72	8.55							
12-04-94	115	1100	22.0	6.68	7.81							
12-05-94	116	900	24.1	6.71	7.01							
12-06-94	117	900	22.7	6.81	7.19							
12-07-94	118	800	22.4	6.80	7.85							
12-08-94	119	1100	25.8	6.80	5.73	54.4	119.7	448	0.00	0.00	0.098	0.00037
12-09-94	120	1000	21.7	6.85	7.17							

12-10-94	121	1300	21.9	6.84	7.90							
12-11-94	122	900	31.1	6.68	2.72							
12-12-94	123	900	24.3	7.66	8.23							
12-13-94	124	900	24.1	7.70	8.67							
12-14-94	125	900	24.0	7.67	8.77							
12-15-94	126	800	20.0	6.86	9.74	47.6	461.7	>1999	0.00	0.00	0.075	0.00022
12-16-94	127	1100	21.1	6.77	8.60							
12-17-94	128	845	21.2	6.75	8.53							
12-18-94	129	930	21.6	6.73	7.65							
12-19-94	130	1000	21.7	6.71	7.47							
12-20-94	131	1100	21.5	6.80	8.18							
12-21-94	132	1000	18.1	6.77	9.56	54.4	273.6	1955	0.00	0.00	0.097	0.00020
12-22-94	133	800	27.7	7.05	6.35							
12-23-94	134	1000	27.7	6.82	5.05							
12-24-94	135	900	27.6	7.08	6.43							
12-25-94	136	700	24.5	7.81	8.17							
12-26-94	137	1000	25.0	7.72	8.11							
12-27-94	138	1100	20.2	6.82	8.66							
12-28-94	139	1000	20.0	6.80	9.44							
12-29-94	140	900	19.3	6.70	8.32	54.4	222.3	1137	0.00	0.00	0.069	0.00013
12-30-94	141	1000	27.2	6.87	6.32							
12-31-94	142	1000	28.0	6.98	2.70							
01-01-95	143	1100	20.5	6.80	8.54							
01-02-95	144	1000	20.0	6.81	8.22							
01-03-95	145	1100	21.4	6.80	7.33							
01-04-95	146	900	17.9	6.90	9.54							
01-05-95	147	1100	26.0	7.19	4.63	74.8	102.6	534	0.00	0.00	0.030	0.00028
01-06-95	148	1000	23.0	7.63	8.50							
01-07-95	149	1130	23.7	7.66	9.41							
01-08-95	150	1030	23.6	7.62	9.16							
01-09-95	151	1000	23.5	7.67	9.61							
01-10-95	152	1000	18.7	6.70	9.92							
01-11-95	153	1000	19.3	6.85	8.82							
01-12-95	154	1100	19.8	6.68	8.39	47.6	119.7	422	0.00	0.00	0.017	0.00003
01-13-95	155	1000	20.4	6.69	8.01							
01-14-95	156	900	21.9	6.71	7.49							
01-15-95	157	800	24.8	6.85	6.75							
01-16-95	158	1030	23.5	6.83	6.85							
01-17-95	159	1000	22.6	6.82	8.28							
01-18-95	160	1000	23.0	7.00	7.02							
01-19-95	161	1000	22.7	7.10	8.17	61.2	530.1	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.1	6.87	7.98							
01-21-95	163	1000	23.1	6.75	7.14							
01-22-95	164	1100	21.9	6.89	8.08							

01-23-95	165	600	20.2	6.86	9.20							
01-24-95	166	1000	21.5	6.79	9.55							
01-25-95	167	1100	24.1	6.80	6.46							
01-26-95	168	1000	21.4	6.78	7.92	47.6	102.6	342	0.00	0.00	0.022	0.00006
01-27-95	169	1000	19.0	6.68	9.35							
01-28-95	170	830	19.5	6.73	8.84							
01-29-95	171	900	22.3	6.78	8.60							
01-30-95	172	1000	19.2	6.83	9.41							
01-31-95	173	1000	20.4	7.62	8.92							
02-01-95	174	1000	18.1	6.93	9.81							
02-02-95	175	900	19.3	6.78	8.75	54.4	153.9	648	0.00	0.00	0.096	0.00022
02-03-95	176	930	25.7	6.84	4.26							
02-04-95	177	1000	18.4	6.95	10.33							
02-05-95	178	1200	25.0	6.83	4.70							
02-06-95	179	930	21.9	7.49	8.75							
02-07-95	180	900	22.4	7.49	8.71							
02-08-95	181	900	22.2	7.45	9.27							
02-09-95	182	900	21.5	7.39	9.64	47.6	85.5	247	0.00	0.00	0.015	0.00016
02-10-95	183	900	21.9	7.34	9.36							
02-11-95	184	900	21.3	7.22	9.86							
02-12-95	185	1200	21.3	7.06	10.08							
02-13-95	186	900	21.2	7.21	10.04							
02-14-95	187	900	21.2	7.21	9.70							
02-15-95	188	900	21.4	7.27	9.78							
02-16-95	189	900	21.4	7.18	9.85	40.8	85.5	243	0.00	0.00	0.028	0.00019
02-17-95	190	900	22.8	7.20	9.45							
02-18-95	191	1100	23.0	7.09	10.03							
02-19-95	192	1400	23.6	7.06	9.73							
02-20-95	193	1000	23.5	7.15	9.49							
02-21-95	194	1000	23.6	7.21	9.42							
02-22-95	195	900	23.7	7.23	9.29							
02-23-95	196	1000	24.5	7.19	9.44	34.0	85.5	249	0.00	0.00	0.046	0.00040
02-24-95	197	1000	24.3	7.22	9.09							
02-25-95	198	1000	24.1	7.22	9.15							
02-26-95	199	1800	24.2	7.16	9.20							
02-27-95	200	900	24.3	7.25	9.06							
02-28-95	201	900	24.4	7.22	9.08							
03-01-95	202	900	24.5	7.15	9.01							
03-02-95	203	900	24.4	7.21	8.98	34.0	85.5	344	0.00	0.00	0.020	0.00018
03-03-95	204	900	24.1	7.20	8.98							
03-04-95	205	1000	22.9	7.16	8.97							
03-05-95	206	1015	23.0	7.10	9.06							
03-06-95	207	900	22.9	7.18	9.17							
03-07-95	208	900	23.2	7.16	8.91							

03-08-95	209	900	22.9	7.24	8.81							
03-09-95	210	1000	23.3	7.22	8.71	40.8	85.5	241	0.00	0.00	0.019	0.00016
03-10-95	211	900	24.5	7.12	8.45							
03-11-95	212	1100	24.0	7.19	8.84							
03-12-95	213	1800	24.8	7.12	8.47							
03-13-95	214	900	24.1	7.18	8.40							
03-14-95	215	900	24.1	7.20	8.73							
03-15-95	216	900	23.6	7.22	8.74							
03-16-95	217	900	25.0	7.15	8.74	47.6	85.5	218	0.00	0.00	0.015	0.00011
03-17-95	218	900	25.1	7.21	8.50							
03-18-95	219	900	24.9	7.27	8.25							
03-19-95	220	1600	25.6	7.18	8.29							
03-20-95	221	900	24.7	7.16	8.42							
03-21-95	222	900	25.2	7.23	8.38							
03-22-95	223	900	25.1	7.19	8.60							
03-23-95	224	1100	25.1	7.19	8.22	47.6	85.5	238	0.00	0.00	a	a
03-24-95	225	900	25.0	7.22	7.33							
03-25-95	226	915	25.0	7.08	7.77							
03-26-95	227	900	25.0	7.06	8.56							
03-27-95	228	900	25.2	7.18	8.00							
03-28-95	229	900	27.2	7.24	8.67							
03-29-95	230	900	24.8	7.21	7.49							
03-30-95	231	900	24.9	7.30	7.25	47.6	85.5	220	0.00	0.00	0.056	0.00051
03-31-95	232	900	24.8	7.22	7.21							
04-01-95	233	900	24.6	7.16	8.00							
04-02-95	234	1000	24.8	7.12	8.48							
04-03-95	235	900	24.6	7.23	8.08							
04-04-95	236	900	25.1	7.30	7.86							
04-05-95	237	900	24.0	7.28	7.75							
04-06-95	238	900	24.8	7.29	7.86	40.8	85.5	230	0.00	0.00	0.050	0.00037
04-07-95	239	900	25.1	7.30	7.82							
04-08-95	240	1100	25.2	7.27	7.92							
04-09-95	241	1300	25.7	7.24	8.34							
04-10-95	242	900	25.3	7.23	7.20							
04-11-95	243	900	25.6	7.30	7.29							
04-12-95	244	900	25.6	7.25	6.97							
04-13-95	245	1100	25.6	7.29	7.10	40.8	85.5	249	0.00	0.00	0.034	0.00028
04-14-95	246	900	25.3	7.15	6.95							
04-15-95	247	1400	25.7	7.28	7.80							
04-16-95	248	1100	24.8	7.21	7.74							
04-17-95	249	900	24.7	7.29	7.64							
04-18-95	250	900	24.6	7.34	7.74							
04-19-95	251	900	25.0	7.33	7.87							
04-20-95	252	900	25.0	7.32	7.54	40.8	68.4	221	0.00	0.00	a	a

04-21-95	253	900	25.4	7.36	7.21							
04-22-95	254	1200	25.6	7.28	7.37							
04-23-95	255	2000	25.6	7.28	7.33							
04-24-95	256	900	24.8	7.38	7.28							
04-25-95	257	900	24.8	7.30	6.93							
04-26-95	258	900	24.6	7.34	7.12							
04-27-95	259	900	25.2	7.32	6.93	40.8	85.5	225	0.00	0.00	a	a
04-28-95	260	900	25.4	7.27	7.00							
04-29-95	261	1100	25.3	7.30	6.68							
04-30-95	262	1600	25.0	7.31	7.34							
05-01-95	263	900	25.4	7.34	7.56							
05-02-95	264	900	25.2	7.34	8.14							
05-03-95	265	900	25.1	7.35	7.08							
05-04-95	266	900	24.9	7.35	7.51	40.8	85.5	226	0.00	0.00	a	a
05-05-95	267	900	25.2	7.33	7.43							
05-06-95	268	830	25.2	7.06	7.33							
05-07-95	269	900	25.1	7.07	7.19							
05-08-95	270	900	25.2	7.20	7.43							
05-09-95	271	900	25.1	7.21	7.31							
05-10-95	272	900	25.7	7.20	7.29							
MEAN			23.4		7.46	51.2	154.4				0.076	0.00028
MINIMUM			17.9	6.61	2.70	34.0	68.4	218	0.00	0.00	0.015	0.00003
MAXIMUM			31.1	7.81	10.70	74.8	547.2	>1999	0.00	0.00	0.555	0.00193
Std Dev			2.08		1.476	10.55	116.87				0.0992	0.000337
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 9
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.91	6.57							
08-13-94	2	900	25.2	6.80	5.66							
08-14-94	3	900	25.2	6.89	5.40							
08-15-94	4	900	23.9	6.74	5.49							
08-16-94	5	1000	24.0	6.87	5.96							
08-17-94	6	1000	25.1	7.00	5.14							
08-18-94	7	900	24.9	6.76	4.03	40.8	85.5	900	0.00	0.00	0.501	0.00162
08-19-94	8	800	24.3	6.69	5.09							
08-20-94	9	1000	25.1	6.76	5.83							
08-21-94	10	800	25.4	6.68	5.58							
08-22-94	11	900	24.2	6.67	5.20							
08-23-94	12	730	22.7	6.72	6.24							
08-24-94	13	1000	23.9	6.54	6.33							
08-25-94	14	1100	23.7	6.67	6.14	54.4	119.7	730	0.00	0.00	0.100	0.00024
08-26-94	15	900	24.1	6.66	5.69							
08-27-94	16	900	24.0	6.76	5.40							
08-28-94	17	800	24.4	6.82	5.49							
08-29-94	18	900	25.2	6.81	4.91							
08-30-94	19	900	22.5	6.73	5.36							
08-31-94	20	800	24.4	6.96	6.18							
09-01-94	21	1100	24.6	6.82	5.89	61.2	119.7	537	0.00	0.00	a	a
09-02-94	22	900	23.7	6.76	5.33							
09-03-94	23	815	24.4	6.74	5.77							
09-04-94	24	810	24.1	6.89	5.76							
09-05-94	25	1100	24.6	6.65	6.22							
09-06-94	26	900	24.6	6.65	6.18							
09-07-94	27	800	24.1	6.74	6.41							
09-08-94	28	1100	24.0	6.82	6.24	74.8	119.7	594	0.00	0.00	0.041	0.00014
09-09-94	29	900	23.8	6.80	6.76							
09-10-94	30	900	24.3	6.80	6.12							
09-11-94	31	800	23.0	6.82	5.96							
09-12-94	32	500	23.8	7.02	6.36							

09-13-94	33	700	24.1	6.89	6.58							
09-14-94	34	1400	27.0	6.91	4.47							
09-15-94	35	1300	26.3	7.00	5.38							
09-16-94	36	1200	25.7	6.65	5.16	40.8	136.8	837	0.00	0.00	0.058	0.00015
09-17-94	37	820	25.6	6.60	5.27							
09-18-94	38	830	25.6	6.74	4.61							
09-19-94	39	1000	24.4	6.89	5.53							
09-20-94	40	1000	24.1	6.81	5.40							
09-21-94	41	1000	25.9	6.82	5.33							
09-22-94	42	900	24.5	6.80	5.57	68.0	119.7	699	0.00	0.00	a	a
09-23-94	43	1000	24.2	6.68	6.41							
09-24-94	44	845	24.0	6.66	5.81							
09-25-94	45	1300	25.3	a	5.69							
09-26-94	46	900	26.4	6.67	3.72							
09-27-94	47	800	25.3	6.59	5.25							
09-28-94	48	1000	24.5	6.59	5.43	47.6	119.7	890	a	a	a	a
09-29-94	49	1030	26.2	6.83	2.81							
09-30-94	50	1030	23.0	6.69	6.76							
10-01-94	51	900	23.5	6.88	6.32							
10-02-94	52	915	22.8	6.74	6.01							
10-03-94	53	1100	21.5	6.75	6.44							
10-04-94	54	1100	22.8	6.77	6.58							
10-05-94	55	1000	23.8	6.80	6.46							
10-06-94	56	800	22.5	6.85	6.90	74.8	119.7	778	0.00	0.00	a	a
10-07-94	57	1100	23.5	6.82	7.33						0.037	0.00012
10-08-94	58	1100	24.4	6.80	7.18							
10-09-94	59	1100	27.0	6.76	5.51							
10-10-94	60	1000	24.6	6.75	5.39							
10-11-94	61	1600	25.3	6.88	3.32							
10-12-94	62	900	21.9	6.88	7.45							
10-13-94	63	1300	24.0	6.77	6.88	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.71	5.91							
10-15-94	65	900	24.2	6.80	6.27							
10-16-94	66	900	23.4	6.52	7.17							
10-17-94	67	1000	23.0	6.75	7.06							
10-18-94	68	800	23.7	6.49	6.73							
10-19-94	69	900	24.4	6.55	7.10							
10-20-94	70	900	24.7	6.54	5.94	34.0	513.0	>1999	0.00	0.00	0.029	0.00006
10-21-94	71	900	22.6	6.64	6.76							
10-22-94	72	800	22.9	6.70	6.64							
10-23-94	73	900	23.6	6.61	6.76							
10-24-94	74	900	22.3	6.64	6.14							
10-25-94	75	900	22.9	6.64	6.41							
10-26-94	76	800	22.1	6.70	6.86							

10-27-94	77	1100	21.7	6.70	7.46	54.4	153.9	812	0.00	0.00	0.082	0.00018
10-28-94	78	1000	21.3	6.78	7.72							
10-29-94	79	900	21.5	6.84	7.70							
10-30-94	80	900	22.0	6.78	7.63							
10-31-94	81	1000	22.8	6.73	7.10							
11-01-94	82	1100	25.2	6.72	5.69							
11-02-94	83	1000	22.5	6.72	6.97							
11-03-94	84	1000	21.8	6.71	6.67							
11-04-94	85	1000	22.5	6.76	6.55	68.0	171.0	953	0.00	0.00	0.200	0.00055
11-05-94	86	1000	23.1	6.78	7.52							
11-06-94	87	1000	24.5	6.72	6.67							
11-07-94	88	700	22.3	6.71	7.45							
11-08-94	89	1000	21.1	6.79	8.25							
11-09-94	90	1000	22.4	6.69	7.42							
11-10-94	91	1100	22.6	6.78	6.90							
11-11-94	92	900	19.8	6.73	7.69	54.4	171.0	837	0.00	0.00	0.077	0.00016
11-12-94	93	845	18.8	6.65	8.20							
11-13-94	94	830	21.1	6.77	7.93							
11-14-94	95	1000	22.0	6.65	7.16							
11-15-94	96	900	22.3	6.67	7.21							
11-16-94	97	900	22.0	6.72	6.65	54.4	153.9	1067	0.00	0.00	0.050	0.00012
11-17-94	98	900	21.5	6.76	7.22							
11-18-94	99	900	24.9	6.59	7.11							
11-19-94	100	800	23.4	6.64	6.59							
11-20-94	101	900	23.2	6.72	6.93							
11-21-94	102	600	22.4	6.71	7.21							
11-22-94	103	600	23.5	6.70	6.98							
11-23-94	104	800	20.3	6.68	8.29	47.6	119.7	1887	0.00	0.00	0.088	0.00017
11-24-94	105	730	23.4	6.67	8.52							
11-25-94	106	1020	23.1	7.01	9.43							
11-26-94	107	1000	21.0	6.67	10.20							
11-27-94	108	900	21.2	6.60	8.97							
11-28-94	109	900	22.8	6.61	8.76							
11-29-94	110	900	22.2	6.58	8.35							
11-30-94	111	900	22.2	6.56	8.19							
12-01-94	112	900	21.9	6.55	8.46	47.6	102.6	421	0.00	0.00	0.120	0.00019
12-02-94	113	1000	22.2	6.68	9.09							
12-03-94	114	1000	21.8	6.64	8.38							
12-04-94	115	1100	23.1	6.61	7.77							
12-05-94	116	900	24.7	6.60	6.97							
12-06-94	117	900	23.5	6.72	7.22							
12-07-94	118	800	23.2	6.72	7.96							
12-08-94	119	1100	26.3	6.70	5.77	54.4	102.6	456	0.00	0.00	0.081	0.00025
12-09-94	120	1000	22.7	6.77	7.29							

12-10-94	121	1300	22.8	6.75	7.84							
12-11-94	122	900	31.2	6.57	2.84							
12-12-94	123	900	24.8	7.38	8.02							
12-13-94	124	900	24.7	7.41	8.39							
12-14-94	125	900	24.5	7.36	8.45							
12-15-94	126	800	21.1	6.79	9.57	47.6	444.6	>1999	0.00	0.00	0.075	0.00020
12-16-94	127	1100	22.4	6.71	8.48							
12-17-94	128	845	22.5	6.71	8.38							
12-18-94	129	930	22.6	6.67	7.72							
12-19-94	130	1000	22.7	6.62	7.47							
12-20-94	131	1100	22.5	6.67	7.88							
12-21-94	132	1000	19.1	6.65	9.36	54.4	256.5	1900	0.00	0.00	0.100	0.00017
12-22-94	133	800	27.7	6.94	6.09							
12-23-94	134	1000	27.9	6.74	4.71							
12-24-94	135	900	27.9	7.00	6.17							
12-25-94	136	700	25.1	7.63	7.91							
12-26-94	137	1000	25.5	7.39	7.61							
12-27-94	138	1100	21.2	6.72	8.37							
12-28-94	139	1000	21.1	6.74	9.14							
12-29-94	140	900	20.6	6.62	8.17	47.6	205.2	1127	0.00	0.00	0.069	0.00012
12-30-94	141	1000	27.8	6.78	6.10							
12-31-94	142	1000	28.2	6.96	2.90							
01-01-95	143	1100	22.0	6.74	8.12							
01-02-95	144	1000	21.6	6.74	7.89							
01-03-95	145	1100	22.8	6.72	7.15							
01-04-95	146	900	20.1	6.81	8.88							
01-05-95	147	1100	26.2	7.13	4.80	68.0	102.6	533	0.00	0.00	0.030	0.00025
01-06-95	148	1000	23.9	7.47	8.08							
01-07-95	149	1130	24.9	7.56	8.79							
01-08-95	150	1030	24.4	7.47	8.72							
01-09-95	151	1000	24.5	7.39	9.12							
01-10-95	152	1000	20.6	6.61	9.28							
01-11-95	153	1000	20.8	6.70	8.29							
01-12-95	154	1100	21.4	6.55	7.73	47.6	119.7	430	0.00	0.00	0.017	0.00003
01-13-95	155	1000	22.0	6.30	7.54							
01-14-95	156	900	23.2	6.65	7.03							
01-15-95	157	800	25.8	6.81	6.15							
01-16-95	158	1030	24.7	6.74	6.31							
01-17-95	159	1000	24.0	6.74	7.34							
01-18-95	160	1000	24.1	6.93	6.41							
01-19-95	161	1000	24.0	7.04	7.53	61.2	564.3	>1999	0.00	0.00	a	a
01-20-95	162	1000	24.6	6.65	7.29							
01-21-95	163	1000	24.9	6.62	6.46							
01-22-95	164	1100	23.9	6.81	7.39							

01-23-95	165	600	22.3	6.67	8.63							
01-24-95	166	1000	22.8	6.72	8.86							
01-25-95	167	1100	24.4	6.63	5.80							
01-26-95	168	1000	20.8	6.72	7.97	47.6	85.5	350	0.00	0.00	0.021	0.00005
01-27-95	169	1000	20.0	6.61	8.72							
01-28-95	170	830	20.8	6.72	8.29							
01-29-95	171	900	23.5	6.66	7.90							
01-30-95	172	1000	20.6	6.78	8.78							
01-31-95	173	1000	21.0	7.36	8.42							
02-01-95	174	1000	19.8	6.86	9.08							
02-02-95	175	900	21.1	6.68	8.17	54.4	136.8	647	0.10	0.00	0.100	0.00021
02-03-95	176	930	26.0	6.78	3.91							
02-04-95	177	1000	19.7	6.89	9.83							
02-05-95	178	1200	25.1	6.77	4.30							
02-06-95	179	930	22.4	7.32	8.26							
02-07-95	180	900	23.0	7.28	8.05							
02-08-95	181	900	23.2	7.23	8.48							
02-09-95	182	900	22.4	7.17	9.10	47.6	85.5	258	0.00	0.00	0.013	0.00009
02-10-95	183	900	22.6	7.08	8.71							
02-11-95	184	900	22.1	7.03	9.25							
02-12-95	185	1200	22.0	6.92	9.48							
02-13-95	186	900	21.7	7.01	9.50							
02-14-95	187	900	21.7	6.99	9.43							
02-15-95	188	900	22.0	6.97	9.32							
02-16-95	189	900	22.0	6.98	9.45	40.8	85.5	254	0.00	0.00	0.028	0.00012
02-17-95	190	900	23.1	6.98	9.15							
02-18-95	191	1100	23.5	6.98	9.73							
02-19-95	192	1400	24.0	6.96	9.33							
02-20-95	193	1000	23.6	6.93	9.05							
02-21-95	194	1000	23.9	7.01	9.13							
02-22-95	195	900	23.9	7.00	8.95							
02-23-95	196	1000	24.5	7.00	9.03	34.0	85.5	257	0.00	0.00	0.049	0.00030
02-24-95	197	1000	24.2	6.98	8.74							
02-25-95	198	1000	24.2	7.03	8.98							
02-26-95	199	1800	24.3	7.08	9.15							
02-27-95	200	900	24.4	7.04	8.88							
02-28-95	201	900	24.5	6.98	8.83							
03-01-95	202	900	24.5	6.95	8.74							
03-02-95	203	900	24.5	7.01	8.67	34.0	85.5	350	0.00	0.00	0.016	0.00009
03-03-95	204	900	24.1	7.01	8.77							
03-04-95	205	900	23.6	6.98	8.77							
03-05-95	206	1015	23.7	7.04	8.83							
03-06-95	207	900	23.5	6.99	8.84							
03-07-95	208	900	23.8	6.98	8.63							

03-08-95	209	900	23.6	6.99	8.64							
03-09-95	210	1000	23.4	7.00	8.62	40.8	85.5	252	0.00	0.00	0.017	0.00009
03-10-95	211	900	24.7	6.97	8.43							
03-11-95	212	1100	24.4	6.93	8.63							
03-12-95	213	1800	25.3	6.96	8.36							
03-13-95	214	900	24.5	6.98	8.34							
03-14-95	215	900	24.5	6.89	8.60							
03-15-95	216	900	24.2	6.96	8.57							
03-16-95	217	900	25.2	6.85	8.53	47.6	85.5	229	0.00	0.00	0.014	0.00005
03-17-95	218	900	25.3	6.95	8.43							
03-18-95	219	1000	25.3	6.99	8.17							
03-19-95	220	1600	26.1	6.96	8.24							
03-20-95	221	900	24.9	6.96	8.44							
03-21-95	222	900	25.3	6.94	8.28							
03-22-95	223	900	25.1	7.00	8.45							
03-23-95	224	1100	25.2	6.96	8.16	47.6	85.5	249	0.00	0.00	a	a
03-24-95	225	900	25.0	6.94	7.45							
03-25-95	226	915	25.1	7.04	7.88							
03-26-95	227	900	24.8	7.06	8.59							
03-27-95	228	900	25.3	6.93	8.05							
03-28-95	229	900	25.0	6.95	7.85							
03-29-95	230	900	24.8	6.97	7.69							
03-30-95	231	900	25.0	6.95	7.43	47.6	85.5	232	0.00	0.00	0.052	0.00021
03-31-95	232	900	24.8	6.97	7.33							
04-01-95	233	900	24.8	7.00	7.83							
04-02-95	234	1000	25.0	7.04	8.09							
04-03-95	235	900	24.4	6.97	8.09							
04-04-95	236	900	25.1	7.04	7.81							
04-05-95	237	900	23.9	6.99	7.80							
04-06-95	238	900	24.6	7.01	7.94	40.8	85.5	241	0.00	0.00	0.048	0.00019
04-07-95	239	900	24.9	6.98	7.85							
04-08-95	240	1100	25.3	7.00	7.95							
04-09-95	241	1300	25.8	6.95	8.35							
04-10-95	242	900	25.3	6.98	7.56							
04-11-95	243	900	25.6	7.00	7.73							
04-12-95	244	900	25.7	7.00	7.51							
04-13-95	245	1100	25.6	7.02	7.46	40.8	85.5	259	0.00	0.00	0.040	0.00018
04-14-95	246	900	25.3	6.92	7.17							
04-15-95	247	1400	25.8	7.02	7.82							
04-16-95	248	1100	24.9	6.97	7.89							
04-17-95	249	900	24.9	6.95	7.78							
04-18-95	250	900	24.7	6.97	7.95							
04-19-95	251	900	25.1	6.99	8.10							
04-20-95	252	900	25.2	6.99	7.74	40.8	85.5	232	0.00	0.00	a	a

04-21-95	253	900	25.4	7.00	7.53							
04-22-95	254	1200	25.7	6.98	7.59							
04-23-95	255	2000	25.6	6.99	7.64							
04-24-95	256	900	24.8	7.02	7.48							
04-25-95	257	900	24.8	6.98	7.23							
04-26-95	258	900	24.5	7.02	6.97							
04-27-95	259	900	25.2	6.99	7.18	40.8	85.5	235	0.00	0.00	a	a
04-28-95	260	900	25.3	6.99	7.28							
04-29-95	261	1100	25.3	7.00	6.92							
04-30-95	262	1600	25.1	7.02	7.46							
05-01-95	263	900	25.3	7.02	7.92							
05-02-95	264	900	25.3	6.98	8.34							
05-03-95	265	900	25.2	7.02	7.43							
05-04-95	266	900	25.0	6.99	7.67	40.8	85.5	237	0.00	0.00	a	a
05-05-95	267	900	25.3	7.01	7.56							
05-06-95	268	830	25.2	6.96	7.27							
05-07-95	269	900	25.0	6.94	7.19							
05-08-95	270	900	25.2	6.98	7.48							
05-09-95	271	900	25.1	7.01	7.36							
05-10-95	272	900	25.6	7.01	7.38							
MEAN			23.8		7.32	50.1	151.2				0.074	0.00022
MINIMUM			18.8	6.30	2.81	34.0	85.5	229	0.00	0.00	0.013	0.00003
MAXIMUM			31.2	7.63	10.20	74.8	564.3	>1999	0.10	0.00	0.501	0.00162
Std Dev			1.71		1.373	10.51	114.95				0.0900	0.000282
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 10
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.91	6.59							
08-13-94	2	900	25.1	6.80	5.64							
08-14-94	3	900	25.1	6.89	5.39							
08-15-94	4	900	24.0	6.74	5.44							
08-16-94	5	1000	23.9	6.87	5.96							
08-17-94	6	1000	25.0	7.00	4.54							
08-18-94	7	900	24.9	6.74	3.90	40.8	85.5	889	0.00	0.00	0.504	0.00156
08-19-94	8	800	24.2	6.69	5.09							
08-20-94	9	1000	25.1	6.76	5.82							
08-21-94	10	800	25.4	6.68	5.56							
08-22-94	11	1000	24.2	6.67	5.12							
08-23-94	12	730	22.7	6.72	6.10							
08-24-94	13	1000	23.9	6.54	6.30							
08-25-94	14	1100	23.7	6.67	6.13	54.4	119.7	730	0.00	0.00	0.095	0.00023
08-26-94	15	900	24.1	6.66	5.64							
08-27-94	16	900	24.0	6.76	5.42							
08-28-94	17	800	24.4	6.82	5.49							
08-29-94	18	900	25.2	6.81	4.91							
08-30-94	19	900	22.4	6.73	5.28							
08-31-94	20	900	24.4	6.96	6.22							
09-01-94	21	1100	24.6	6.82	5.92	61.2	136.8	537	0.00	0.00	a	a
09-02-94	22	900	23.6	6.76	5.44							
09-03-94	23	815	24.4	6.77	5.64							
09-04-94	24	810	24.2	6.91	5.71							
09-05-94	25	1100	24.5	6.65	6.18							
09-06-94	26	900	24.5	6.65	6.19							
09-07-94	27	800	24.1	6.74	6.44							
09-08-94	28	1100	24.0	6.82	6.23	68.0	119.7	592	0.00	0.00	0.040	0.00014
09-09-94	29	900	23.8	6.80	6.78							
09-10-94	30	900	24.3	6.80	6.15							
09-11-94	31	800	23.0	6.82	5.97							
09-12-94	32	500	23.8	7.02	6.35							

09-13-94	33	700	24.0	6.89	6.61							
09-14-94	34	1400	26.9	6.91	4.27							
09-15-94	35	1300	26.2	7.00	5.55							
09-16-94	36	1200	25.6	6.65	5.07	40.8	119.7	834	0.00	0.00	0.065	0.00017
09-17-94	37	820	25.6	6.60	5.12							
09-18-94	38	830	25.5	6.76	4.66							
09-19-94	39	1000	24.4	6.89	5.45							
09-20-94	40	1000	23.9	6.81	5.31							
09-21-94	41	1000	25.8	6.82	5.35							
09-22-94	42	900	24.4	6.80	5.62	68.0	119.7	698	0.00	0.00	a	a
09-23-94	43	1000	24.1	6.68	6.40							
09-24-94	44	845	24.2	6.67	5.90							
09-25-94	45	1300	25.3	a	5.78							
09-26-94	46	900	26.3	6.68	4.10							
09-27-94	47	800	25.2	6.59	5.50							
09-28-94	48	1000	24.5	6.59	5.46	47.6	119.7	891	a	a	a	a
09-29-94	49	1030	26.2	6.81	2.86							
09-30-94	50	1030	22.9	6.74	6.70							
10-01-94	51	900	23.5	6.89	6.26							
10-02-94	52	915	22.8	6.75	5.99							
10-03-94	53	1100	21.7	6.75	6.49							
10-04-94	54	1100	22.9	6.77	6.68							
10-05-94	55	1000	23.8	6.80	6.55							
10-06-94	56	800	22.6	6.85	6.93	74.8	119.7	778	0.00	0.00	a	a
10-07-94	57	1100	23.6	6.82	7.37						0.035	0.00012
10-08-94	58	1100	24.4	6.80	7.16							
10-09-94	59	1100	26.9	6.76	5.54							
10-10-94	60	1000	24.5	6.75	5.39							
10-11-94	61	1600	25.2	6.92	5.33							
10-12-94	62	900	21.9	6.88	7.57							
10-13-94	63	1300	24.0	6.77	6.81	47.6	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.71	6.03							
10-15-94	65	900	24.3	6.80	6.26							
10-16-94	66	900	23.5	6.52	7.16							
10-17-94	67	1000	23.0	6.75	7.06							
10-18-94	68	800	23.5	6.49	6.62							
10-19-94	69	900	24.2	6.55	6.92							
10-20-94	70	900	24.5	6.54	5.84	34.0	495.9	>1999	0.00	0.00	0.034	0.00006
10-21-94	71	900	22.5	6.64	6.60							
10-22-94	72	800	22.7	6.70	6.44							
10-23-94	73	900	23.5	6.61	6.60							
10-24-94	74	900	22.2	6.64	6.05							
10-25-94	75	900	22.8	6.64	6.33							
10-26-94	76	800	21.9	6.70	6.80							

10-27-94	77	1100	21.7	6.70	7.40	54.4	136.8	815	0.00	0.00	0.087	0.00020
10-28-94	78	1000	21.2	6.78	7.65							
10-29-94	79	900	21.4	6.84	7.65							
10-30-94	80	900	21.9	6.78	7.62							
10-31-94	81	1000	22.8	6.73	7.02							
11-01-94	82	1100	25.1	6.72	5.62							
11-02-94	83	1000	22.5	6.72	7.03							
11-03-94	84	1000	21.8	6.71	6.68							
11-04-94	85	1000	22.5	6.76	6.56	68.0	171.0	951	0.00	0.00	0.190	0.00052
11-05-94	86	1000	22.9	6.78	7.62							
11-06-94	87	1000	24.5	6.72	6.75							
11-07-94	88	700	22.3	6.71	7.44							
11-08-94	89	1000	21.0	6.79	8.17							
11-09-94	90	1000	22.4	6.69	7.43							
11-10-94	91	1100	22.6	6.78	6.88							
11-11-94	92	900	19.7	6.73	7.69	54.4	171.0	843	0.00	0.00	0.080	0.00017
11-12-94	93	845	18.8	6.67	8.14							
11-13-94	94	830	21.2	6.75	7.91							
11-14-94	95	1000	22.0	6.65	7.22							
11-15-94	96	900	22.4	6.67	7.19							
11-16-94	97	900	22.0	6.72	6.62	54.4	136.8	1074	0.00	0.00	0.052	0.00012
11-17-94	98	900	21.5	6.76	7.20							
11-18-94	99	900	24.9	6.59	7.09							
11-19-94	100	800	23.4	6.64	6.59							
11-20-94	101	900	23.2	6.72	6.93							
11-21-94	102	600	22.4	6.71	7.21							
11-22-94	103	600	23.6	6.70	6.92							
11-23-94	104	800	20.4	6.68	8.31	47.6	119.7	1898	0.00	0.00	0.099	0.00019
11-24-94	105	730	23.0	6.67	8.59							
11-25-94	106	1020	23.0	6.95	9.41							
11-26-94	107	1000	20.9	6.67	10.26							
11-27-94	108	900	21.1	6.60	9.07							
11-28-94	109	900	22.6	6.61	8.81							
11-29-94	110	900	22.1	6.58	8.42							
11-30-94	111	900	22.1	6.56	8.28							
12-01-94	112	900	21.7	6.55	8.56	47.6	102.6	413	0.00	0.00	0.120	0.00019
12-02-94	113	1000	22.0	6.67	9.20							
12-03-94	114	1000	21.5	6.65	8.46							
12-04-94	115	1100	23.0	6.61	7.83							
12-05-94	116	900	24.6	6.60	7.07							
12-06-94	117	900	23.4	6.72	7.40							
12-07-94	118	800	23.2	6.72	8.10							
12-08-94	119	1100	26.4	6.70	5.84	54.4	102.6	452	0.00	0.00	0.087	0.00027
12-09-94	120	1000	22.7	6.77	7.80							

12-10-94	121	1300	22.8	6.75	7.85							
12-11-94	122	900	31.2	6.57	2.94							
12-12-94	123	900	24.8	7.38	8.12							
12-13-94	124	900	24.6	7.41	8.45							
12-14-94	125	900	24.4	7.36	8.56							
12-15-94	126	800	21.0	6.79	9.64	47.6	444.6	>1999	0.00	0.00	0.090	0.00024
12-16-94	127	1100	22.4	6.71	8.59							
12-17-94	128	845	22.4	6.69	8.41							
12-18-94	129	930	22.3	6.66	7.92							
12-19-94	130	1000	22.7	6.62	7.65							
12-20-94	131	1100	22.4	6.67	8.04							
12-21-94	132	1000	19.1	6.65	9.40	54.4	256.5	1902	0.00	0.00	0.091	0.00015
12-22-94	133	800	27.6	6.94	6.29							
12-23-94	134	1000	27.9	6.74	4.98							
12-24-94	135	900	27.9	7.00	6.44							
12-25-94	136	700	24.8	7.58	8.00							
12-26-94	137	1000	25.4	7.39	7.83							
12-27-94	138	1100	20.9	6.72	8.60							
12-28-94	139	1000	20.9	6.74	9.35							
12-29-94	140	900	20.4	6.62	8.35	47.6	205.2	1097	0.00	0.00	0.071	0.00012
12-30-94	141	1000	27.8	6.78	6.44							
12-31-94	142	1000	28.2	6.96	2.95							
01-01-95	143	1100	21.5	6.74	8.39							
01-02-95	144	1000	21.3	6.74	8.15							
01-03-95	145	1100	22.4	6.72	7.50							
01-04-95	146	900	19.7	6.81	9.25							
01-05-95	147	1100	26.2	7.13	4.64	68.0	102.6	527	0.00	0.00	0.027	0.00022
01-06-95	148	1000	23.8	7.43	8.24							
01-07-95	149	1130	24.9	7.51	8.66							
01-08-95	150	1030	24.5	7.44	8.70							
01-09-95	151	1000	24.5	7.39	8.95							
01-10-95	152	1000	20.4	6.61	9.33							
01-11-95	153	1000	20.8	6.70	8.38							
01-12-95	154	1100	21.4	6.55	7.74	47.6	119.7	427	0.00	0.00	0.016	0.00002
01-13-95	155	1000	21.9	6.30	7.79							
01-14-95	156	900	23.0	6.65	7.05							
01-15-95	157	800	25.6	6.81	6.11							
01-16-95	158	1030	24.5	6.74	6.27							
01-17-95	159	1000	23.5	6.74	7.55							
01-18-95	160	1000	24.0	6.93	6.39							
01-19-95	161	1000	23.6	7.04	7.70	61.2	513.0	>1999	0.00	0.00	a	a
01-20-95	162	1000	24.0	6.65	7.43							
01-21-95	163	1000	24.6	6.62	6.39							
01-22-95	164	1100	23.7	6.81	7.33							

01-23-95	165	600	21.8	6.67	8.62							
01-24-95	166	1000	22.8	6.72	8.82							
01-25-95	167	1100	25.1	6.63	5.48							
01-26-95	168	1000	20.2	6.72	8.16	47.6	102.6	348	0.00	0.00	0.022	0.00005
01-27-95	169	1000	19.5	6.61	8.78							
01-28-95	170	830	20.5	6.69	8.36							
01-29-95	171	900	23.2	6.66	7.82							
01-30-95	172	1000	20.3	6.78	8.78							
01-31-95	173	1000	21.0	7.36	8.30							
02-01-95	174	1000	19.2	6.86	9.12							
02-02-95	175	900	20.8	6.68	8.16	54.4	136.8	644	0.00	0.00	0.075	0.00015
02-03-95	176	930	26.0	6.78	2.97							
02-04-95	177	1000	19.4	6.89	9.66							
02-05-95	178	1200	25.1	6.77	3.73							
02-06-95	179	930	22.2	7.32	8.37							
02-07-95	180	900	22.8	7.28	8.17							
02-08-95	181	900	22.8	7.23	8.48							
02-09-95	182	900	22.1	7.17	9.02	47.6	85.5	256	0.00	0.00	0.012	0.00008
02-10-95	183	900	22.5	7.08	8.56							
02-11-95	184	900	22.0	7.03	9.22							
02-12-95	185	1200	21.9	6.92	9.45							
02-13-95	186	900	21.6	7.01	9.47							
02-14-95	187	900	21.6	6.99	9.32							
02-15-95	188	900	21.7	6.97	9.25							
02-16-95	189	900	21.8	6.98	9.43	40.8	85.5	253	0.00	0.00	0.026	0.00011
02-17-95	190	900	22.7	6.98	9.14							
02-18-95	191	1100	23.0	6.98	9.67							
02-19-95	192	1400	23.4	6.96	9.45							
02-20-95	193	1000	23.1	6.93	9.16							
02-21-95	194	1000	23.3	7.01	9.15							
02-22-95	195	900	23.3	7.00	9.04							
02-23-95	196	1000	24.0	7.00	9.05	34.0	85.5	255	0.00	0.00	0.056	0.00030
02-24-95	197	1000	23.6	6.98	8.77							
02-25-95	198	1000	23.9	7.03	8.93							
02-26-95	199	1800	23.9	7.08	9.02							
02-27-95	200	900	23.9	7.04	8.80							
02-28-95	201	900	24.2	6.98	8.80							
03-01-95	202	900	24.2	6.95	8.78							
03-02-95	203	900	24.1	7.01	8.81	34.0	85.5	349	0.00	0.00	0.016	0.00009
03-03-95	204	900	23.7	7.01	8.74							
03-04-95	205	1000	23.0	6.98	8.85							
03-05-95	206	1015	23.2	7.02	8.86							
03-06-95	207	900	23.0	6.99	8.93							
03-07-95	208	900	23.1	6.98	8.75							

03-08-95	209	900	23.0	6.99	8.55							
03-09-95	210	1000	22.9	7.00	8.60	40.8	85.5	250	0.00	0.00	0.016	0.00008
03-10-95	211	900	24.2	6.97	8.40							
03-11-95	212	1100	24.0	6.93	8.42							
03-12-95	213	1800	25.3	6.96	8.43							
03-13-95	214	900	24.0	6.98	8.12							
03-14-95	215	900	24.1	6.89	8.60							
03-15-95	216	900	23.7	6.96	8.56							
03-16-95	217	900	25.2	6.85	8.57	47.6	85.5	227	0.00	0.00	0.012	0.00004
03-17-95	218	900	25.2	6.95	8.34							
03-18-95	219	1000	25.3	6.99	8.11							
03-19-95	220	1600	26.0	6.96	8.11							
03-20-95	221	900	24.8	6.96	8.32							
03-21-95	222	900	25.4	6.94	8.18							
03-22-95	223	900	25.1	7.00	8.36							
03-23-95	224	1100	25.4	6.96	8.01	47.6	85.5	250	0.00	0.00	a	a
03-24-95	225	900	25.2	6.94	7.28							
03-25-95	226	915	25.2	7.00	7.69							
03-26-95	227	900	25.1	7.00	8.37							
03-27-95	228	900	25.3	6.93	7.74							
03-28-95	229	900	25.1	6.95	7.68							
03-29-95	230	900	24.9	6.97	7.67							
03-30-95	231	900	25.0	6.95	7.47	47.6	85.5	232	0.00	0.00	0.066	0.00027
03-31-95	232	900	24.9	6.97	7.34							
04-01-95	233	900	24.7	6.98	7.68							
04-02-95	234	1000	24.9	7.00	8.10							
04-03-95	235	900	24.4	6.97	7.97							
04-04-95	236	900	25.0	7.04	7.73							
04-05-95	237	900	23.9	6.99	7.79							
04-06-95	238	900	24.6	7.01	7.90	40.8	85.5	241	0.00	0.00	0.048	0.00019
04-07-95	239	900	25.0	6.98	7.62							
04-08-95	240	1100	25.3	7.00	7.74							
04-09-95	241	1300	25.8	6.95	8.10							
04-10-95	242	900	25.3	6.98	7.31							
04-11-95	243	900	25.5	7.00	7.45							
04-12-95	244	900	25.7	7.00	7.41							
04-13-95	245	1100	25.5	7.02	7.44	40.8	85.5	259	0.00	0.00	0.039	0.00017
04-14-95	246	900	25.4	6.92	6.93							
04-15-95	247	1400	25.7	7.02	7.64							
04-16-95	248	1100	24.8	6.97	7.65							
04-17-95	249	900	24.8	6.95	7.45							
04-18-95	250	900	24.6	6.97	7.79							
04-19-95	251	900	25.0	6.99	7.98							
04-20-95	252	900	25.1	6.99	7.68	40.8	85.5	232	0.00	0.00	a	a

04-21-95	253	900	25.3	7.00	7.36							
04-22-95	254	1200	25.6	6.98	7.26							
04-23-95	255	2000	25.6	6.99	7.49							
04-24-95	256	900	24.7	7.02	7.30							
04-25-95	257	900	24.7	6.98	7.26							
04-26-95	258	900	24.6	7.02	6.89							
04-27-95	259	900	25.2	6.99	7.19	40.8	85.5	234	0.00	0.00	a	a
04-28-95	260	900	25.3	6.99	7.24							
04-29-95	261	1100	25.3	7.00	6.90							
04-30-95	262	1600	25.0	7.02	7.45							
05-01-95	263	900	25.2	7.02	7.75							
05-02-95	264	900	25.2	6.98	8.24							
05-03-95	265	900	25.1	7.02	7.40							
05-04-95	266	900	25.0	6.99	7.50	40.8	85.5	237	0.00	0.00	a	a
05-05-95	267	900	25.2	7.01	7.51							
05-06-95	268	830	25.1	6.95	7.29							
05-07-95	269	900	25.2	6.96	7.15							
05-08-95	270	900	25.1	6.98	7.55							
05-09-95	271	900	25.0	7.01	7.29							
05-10-95	272	900	25.6	7.01	7.33							
MEAN			23.7		7.31	49.7	149.0				0.075	0.00021
MINIMUM			18.8	6.30	2.86	34.0	85.5	227	0.00	0.00	0.012	0.00002
MAXIMUM			31.2	7.58	10.26	74.8	513.0	>1999	0.00	0.00	0.504	0.00156
Std Dev			1.75		1.375	10.12	108.64				0.0899	0.000272
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 11
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.92	6.68							
08-13-94	2	900	25.2	6.85	5.70							
08-14-94	3	900	25.2	6.95	5.47							
08-15-94	4	900	23.9	6.80	5.64							
08-16-94	5	1000	23.9	6.90	5.88							
08-17-94	6	1000	25.0	7.00	4.53							
08-18-94	7	900	24.8	6.74	3.62	40.8	85.5	900	0.00	0.00	0.612	0.00188
08-19-94	8	800	24.3	6.72	5.29							
08-20-94	9	1000	25.1	6.76	5.98							
08-21-94	10	800	25.4	6.70	5.75							
08-22-94	11	900	24.2	6.68	5.38							
08-23-94	12	730	22.7	6.74	6.35							
08-24-94	13	1000	23.9	6.54	6.47							
08-25-94	14	1100	23.8	6.70	6.31	54.4	119.7	738	0.00	0.00	0.126	0.00033
08-26-94	15	900	24.2	6.70	5.90							
08-27-94	16	900	24.0	6.78	5.65							
08-28-94	17	800	24.4	6.82	5.62							
08-29-94	18	900	25.2	6.85	5.06							
08-30-94	19	900	22.4	6.73	5.52							
08-31-94	20	900	24.3	6.98	6.33							
09-01-94	21	1100	24.5	6.83	6.09	61.2	119.7	528	0.00	0.00	a	a
09-02-94	22	900	23.5	6.77	5.54							
09-03-94	23	815	24.4	6.83	5.98							
09-04-94	24	810	24.1	6.95	5.98							
09-05-94	25	1100	24.4	6.68	6.44							
09-06-94	26	900	24.4	6.69	6.49							
09-07-94	27	800	23.9	6.74	6.57							
09-08-94	28	1100	23.8	6.86	6.53	74.8	102.6	594	0.00	0.00	0.025	0.00009
09-09-94	29	900	23.7	6.83	6.96							
09-10-94	30	900	24.1	6.83	6.30							
09-11-94	31	800	22.7	6.85	6.11							
09-12-94	32	500	23.7	7.05	6.41							

09-13-94	33	500	23.9	6.92	6.66							
09-14-94	34	1400	26.9	6.95	4.43							
09-15-94	35	1300	26.2	7.05	6.03							
09-16-94	36	1200	25.6	6.65	5.22	40.8	119.7	838	0.00	0.00	0.085	0.00022
09-17-94	37	820	25.5	6.66	5.17							
09-18-94	38	830	25.5	6.81	4.73							
09-19-94	39	1000	24.4	6.91	5.30							
09-20-94	40	1000	23.9	6.83	4.96							
09-21-94	41	1000	25.9	6.84	5.11							
09-22-94	42	900	24.4	6.83	5.74	68.0	119.7	702	0.00	0.00	a	a
09-23-94	43	1000	24.1	6.71	6.43							
09-24-94	44	845	24.0	6.70	6.01							
09-25-94	45	1300	25.3	a	6.00							
09-26-94	46	900	26.4	6.70	4.26							
09-27-94	47	800	25.2	6.61	5.71							
09-28-94	48	1000	24.5	6.61	5.51	47.6	119.7	862	a	a	a	a
09-29-94	49	1030	26.1	6.86	2.96							
09-30-94	50	1030	22.9	6.75	6.91							
10-01-94	51	900	23.4	6.90	6.48							
10-02-94	52	915	22.8	6.76	6.27							
10-03-94	53	1100	21.5	6.77	6.54							
10-04-94	54	1100	22.9	6.79	6.67							
10-05-94	55	1000	23.8	6.82	6.55							
10-06-94	56	800	22.7	6.86	6.82	68.0	119.7	788	0.00	0.00	a	a
10-07-94	57	1100	23.7	6.82	7.24						0.032	0.00011
10-08-94	58	1100	24.4	6.80	7.19							
10-09-94	59	1100	27.0	6.77	5.51							
10-10-94	60	1000	24.6	6.75	5.45							
10-11-94	61	1600	25.3	6.95	3.37							
10-12-94	62	900	22.0	6.88	7.48							
10-13-94	63	1300	24.2	6.78	6.91	54.4	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.6	6.71	6.07							
10-15-94	65	900	24.6	6.80	6.31							
10-16-94	66	900	23.6	6.52	7.18							
10-17-94	67	1000	23.2	6.75	7.11							
10-18-94	68	800	23.7	6.49	6.62							
10-19-94	69	900	24.3	6.55	7.02							
10-20-94	70	900	24.3	6.55	5.98	34.0	495.9	>1999	0.00	0.00	0.030	0.00006
10-21-94	71	900	22.4	6.66	6.68							
10-22-94	72	800	22.6	6.70	6.56							
10-23-94	73	900	23.4	6.63	6.77							
10-24-94	74	900	22.1	6.64	6.24							
10-25-94	75	900	22.8	6.64	6.48							
10-26-94	76	800	22.0	6.70	7.06							

10-27-94	77	1100	21.7	6.71	7.60	54.4	136.8	816	0.00	0.00	0.082	0.00019
10-28-94	78	1000	21.2	6.80	7.86							
10-29-94	79	900	21.4	6.84	7.80							
10-30-94	80	900	21.9	6.78	7.84							
10-31-94	81	1000	22.8	6.73	7.25							
11-01-94	82	1100	25.2	6.72	5.74							
11-02-94	83	1000	22.6	6.72	7.07							
11-03-94	84	1000	21.8	6.71	6.82							
11-04-94	85	1000	22.5	6.76	6.69	68.0	171.0	954	0.00	0.00	0.200	0.00055
11-05-94	86	1000	22.9	6.78	7.71							
11-06-94	87	1000	24.4	6.72	6.84							
11-07-94	88	700	22.3	6.71	7.57							
11-08-94	89	1000	20.9	6.80	8.49							
11-09-94	90	1000	22.4	6.69	7.68							
11-10-94	91	1100	22.7	6.78	6.98							
11-11-94	92	900	19.8	6.73	7.80	54.4	171.0	906	0.00	0.00	0.074	0.00016
11-12-94	93	845	18.9	6.68	8.22							
11-13-94	94	830	21.3	6.76	7.73							
11-14-94	95	1000	22.0	6.68	7.35							
11-15-94	96	900	22.4	6.67	7.28							
11-16-94	97	900	22.1	6.72	6.77	54.4	136.8	1084	0.00	0.00	0.051	0.00012
11-17-94	98	900	21.6	6.76	7.32							
11-18-94	99	900	24.8	6.59	7.15							
11-19-94	100	800	23.3	6.64	6.71							
11-20-94	101	900	23.1	6.72	7.10							
11-21-94	102	600	22.1	6.71	7.33							
11-22-94	103	600	23.4	6.70	7.11							
11-23-94	104	800	19.6	6.68	8.52	47.6	102.6	1979	0.00	0.00	0.089	0.00016
11-24-94	105	730	22.7	6.66	8.64							
11-25-94	106	1020	22.6	6.96	9.43							
11-26-94	107	1000	20.4	6.67	10.25							
11-27-94	108	900	20.6	6.60	8.78							
11-28-94	109	900	22.0	6.61	8.79							
11-29-94	110	900	21.6	6.58	8.48							
11-30-94	111	900	21.7	6.56	8.37							
12-01-94	112	900	21.0	6.55	8.65	47.6	102.6	404	0.00	0.00	0.110	0.00017
12-02-94	113	1000	21.3	6.68	9.25							
12-03-94	114	1000	20.8	6.66	8.37							
12-04-94	115	1100	22.4	6.62	7.83							
12-05-94	116	900	24.0	6.60	7.11							
12-06-94	117	900	23.0	6.72	7.31							
12-07-94	118	800	22.6	6.72	7.96							
12-08-94	119	1100	26.0	6.70	5.88	54.4	102.6	443	0.00	0.00	0.094	0.00029
12-09-94	120	1000	22.1	6.77	7.44							

12-10-94	121	1300	22.1	6.75	8.09							
12-11-94	122	900	31.0	6.62	3.22							
12-12-94	123	900	24.5	7.38	8.19							
12-13-94	124	900	24.2	7.41	8.52							
12-14-94	125	900	24.1	7.36	8.55							
12-15-94	126	800	20.6	6.79	9.68	47.6	410.4	>1999	0.00	0.00	0.079	0.00020
12-16-94	127	1100	21.9	6.71	8.61							
12-17-94	128	845	21.9	6.68	8.41							
12-18-94	129	930	22.2	6.67	7.65							
12-19-94	130	1000	22.3	6.62	7.53							
12-20-94	131	1100	21.7	6.67	7.99							
12-21-94	132	1000	18.8	6.65	9.49	54.4	256.5	1891	0.00	0.00	0.092	0.00015
12-22-94	133	800	27.6	6.94	6.43							
12-23-94	134	1000	27.8	6.74	5.35							
12-24-94	135	900	27.8	7.00	6.52							
12-25-94	136	700	24.8	7.56	8.09							
12-26-94	137	1000	25.1	7.39	8.09							
12-27-94	138	1100	20.7	6.72	8.62							
12-28-94	139	1000	20.7	6.74	9.38							
12-29-94	140	900	20.0	6.62	8.35	47.6	205.2	1062	0.00	0.00	0.067	0.00011
12-30-94	141	1000	27.7	6.78	6.52							
12-31-94	142	1000	28.0	6.96	3.20							
01-01-95	143	1100	21.0	6.74	8.47							
01-02-95	144	1000	20.8	6.74	8.16							
01-03-95	145	1100	21.9	6.72	7.78							
01-04-95	146	900	19.0	6.81	9.37							
01-05-95	147	1100	26.0	7.13	5.23	68.0	102.6	518	0.00	0.00	0.025	0.00020
01-06-95	148	1000	23.6	7.43	8.41							
01-07-95	149	1130	24.4	7.50	9.01							
01-08-95	150	1030	24.3	7.45	8.86							
01-09-95	151	1000	24.1	7.41	9.34							
01-10-95	152	1000	19.9	6.61	9.41							
01-11-95	153	1000	20.3	6.70	8.52							
01-12-95	154	1100	21.0	6.55	7.95	47.6	119.7	419	0.00	0.00	0.017	0.00003
01-13-95	155	1000	21.2	6.30	7.78							
01-14-95	156	900	22.5	6.65	7.29							
01-15-95	157	800	25.1	6.81	6.54							
01-16-95	158	1030	23.8	6.74	6.67							
01-17-95	159	1000	22.9	6.74	7.95							
01-18-95	160	1000	23.2	6.92	6.83							
01-19-95	161	1000	22.9	7.04	8.11	54.4	581.4	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.3	6.65	7.82							
01-21-95	163	1000	23.9	6.62	6.99							
01-22-95	164	1100	22.6	6.81	7.69							

01-23-95	165	600	20.6	6.67	8.82							
01-24-95	166	1000	21.5	6.72	9.34							
01-25-95	167	1100	23.8	6.63	6.05							
01-26-95	168	1000	19.8	6.70	8.33	47.6	102.6	373	0.00	0.00	0.022	0.00002
01-27-95	169	1000	19.0	6.61	9.05							
01-28-95	170	830	19.9	6.71	8.52							
01-29-95	171	900	22.5	6.66	8.07							
01-30-95	172	1000	19.5	6.78	9.02							
01-31-95	173	1000	20.4	7.38	8.77							
02-01-95	174	1000	19.0	6.86	9.47							
02-02-95	175	900	20.4	6.68	8.38	54.4	136.8	649	0.00	0.00	0.073	0.00014
02-03-95	176	930	26.0	6.76	4.13							
02-04-95	177	1000	18.8	6.89	10.22							
02-05-95	178	1200	24.9	6.77	4.75							
02-06-95	179	930	21.7	7.32	8.63							
02-07-95	180	900	22.3	7.28	8.64							
02-08-95	181	900	22.3	7.23	9.08							
02-09-95	182	900	21.6	7.17	9.59	47.6	85.5	250	0.00	0.00	0.012	0.00008
02-10-95	183	900	21.5	7.08	9.44							
02-11-95	184	900	21.1	7.03	9.84							
02-12-95	185	1200	21.1	6.92	9.95							
02-13-95	186	900	21.0	7.01	9.85							
02-14-95	187	900	20.8	6.99	9.65							
02-15-95	188	900	21.1	6.97	9.79							
02-16-95	189	900	21.0	6.98	9.88	40.8	85.5	248	0.00	0.00	0.026	0.00011
02-17-95	190	900	22.9	6.98	9.33							
02-18-95	191	1100	23.2	6.98	9.82							
02-19-95	192	1400	23.7	6.96	9.52							
02-20-95	193	1000	23.5	6.93	9.35							
02-21-95	194	1000	23.4	7.01	9.42							
02-22-95	195	900	23.7	7.00	9.18							
02-23-95	196	1000	24.4	7.00	9.29	34.0	85.5	254	0.00	0.00	0.054	0.00030
02-24-95	197	1000	24.0	6.98	9.07							
02-25-95	198	1000	23.9	7.03	9.21							
02-26-95	199	1800	24.0	7.08	9.21							
02-27-95	200	900	24.0	7.04	9.14							
02-28-95	201	900	24.4	6.98	9.07							
03-01-95	202	900	24.3	6.95	9.04							
03-02-95	203	900	24.2	7.01	9.06	34.0	85.5	348	0.00	0.00	0.015	0.00008
03-03-95	204	900	24.0	7.01	9.03							
03-04-95	205	1000	23.6	6.98	8.85							
03-05-95	206	1015	23.3	7.00	8.88							
03-06-95	207	900	23.5	6.99	8.98							
03-07-95	208	900	23.7	6.98	8.77							

03-08-95	209	900	23.6	6.99	8.76							
03-09-95	210	1000	23.6	7.00	8.72	40.8	85.5	250	0.00	0.00	0.015	0.00008
03-10-95	211	900	24.8	6.97	8.48							
03-11-95	212	1100	24.4	6.93	8.76							
03-12-95	213	1800	25.4	6.96	8.26							
03-13-95	214	900	24.4	6.98	8.58							
03-14-95	215	900	24.5	6.89	8.77							
03-15-95	216	900	24.1	6.96	8.84							
03-16-95	217	900	25.3	6.85	8.83	47.6	85.5	220	0.00	0.00	0.012	0.00004
03-17-95	218	900	25.3	6.95	8.70							
03-18-95	219	1000	25.3	6.99	8.36							
03-19-95	220	1600	25.9	6.96	8.24							
03-20-95	221	900	24.8	6.96	8.33							
03-21-95	222	900	25.5	6.94	8.50							
03-22-95	223	900	25.2	7.00	8.81							
03-23-95	224	1100	25.2	6.96	8.40	47.6	85.5	241	0.00	0.00	a	a
03-24-95	225	900	25.0	6.94	7.73							
03-25-95	226	915	25.2	7.00	8.22							
03-26-95	227	900	25.0	7.00	8.37							
03-27-95	228	900	25.3	6.93	8.22							
03-28-95	229	900	25.2	6.95	8.15							
03-29-95	230	900	24.8	6.97	8.10							
03-30-95	231	900	25.2	6.95	7.58	47.6	85.5	225	0.00	0.00	0.074	0.00030
03-31-95	232	900	25.0	6.97	7.44							
04-01-95	233	900	25.0	7.00	7.93							
04-02-95	234	1000	25.0	7.04	8.43							
04-03-95	235	900	24.7	6.97	8.16							
04-04-95	236	900	25.3	7.04	8.07							
04-05-95	237	900	24.2	6.99	8.01							
04-06-95	238	900	24.8	7.01	8.14	40.8	85.5	235	0.00	0.00	0.049	0.00019
04-07-95	239	900	25.2	6.98	8.04							
04-08-95	240	1100	25.5	7.00	7.99							
04-09-95	241	1300	26.0	6.95	8.25							
04-10-95	242	900	25.4	6.98	7.49							
04-11-95	243	900	25.6	7.00	7.53							
04-12-95	244	900	25.8	7.00	7.44							
04-13-95	245	1100	25.8	7.02	7.33	40.8	85.5	254	0.00	0.00	0.038	0.00017
04-14-95	246	900	25.5	6.92	7.23							
04-15-95	247	1400	25.8	7.02	7.92							
04-16-95	248	1100	25.0	6.97	7.96							
04-17-95	249	900	24.9	6.95	7.89							
04-18-95	250	900	24.9	6.97	8.03							
04-19-95	251	900	25.2	6.99	8.12							
04-20-95	252	900	25.2	6.99	7.65	40.8	85.5	227	0.00	0.00	a	a

04-21-95	253	900	25.6	7.00	7.49							
04-22-95	254	1200	25.9	6.98	7.39							
04-23-95	255	2000	25.9	6.99	7.37							
04-24-95	256	900	24.9	7.02	7.47							
04-25-95	257	900	25.0	6.98	7.30							
04-26-95	258	900	24.8	7.02	7.34							
04-27-95	259	900	25.3	6.99	7.29	40.8	85.5	230	0.00	0.00	a	a
04-28-95	260	900	25.5	6.99	7.40							
04-29-95	261	1100	25.5	7.00	6.98							
04-30-95	262	1600	25.2	7.02	7.59							
05-01-95	263	900	25.4	7.02	8.15							
05-02-95	264	900	25.3	6.98	8.56							
05-03-95	265	900	25.3	7.02	7.54							
05-04-95	266	900	25.1	6.99	7.82	40.8	85.5	226	0.00	0.00	a	a
05-05-95	267	900	25.4	7.01	7.71							
05-06-95	268	830	25.2	6.95	7.23							
05-07-95	269	900	25.2	6.99	7.48							
05-08-95	270	900	25.2	6.98	7.75							
05-09-95	271	900	25.3	7.01	7.41							
05-10-95	272	900	25.9	7.01	7.56							
MEAN			23.6		7.48	49.7	148.5				0.079	0.00023
MINIMUM			18.8	6.30	2.96	34.0	85.5	220	0.00	0.00	0.012	0.00002
MAXIMUM			31.0	7.56	10.25	74.8	581.4	>1999	0.00	0.00	0.612	0.00188
Std Dev			1.90		1.406	10.00	113.23				0.1089	0.000331
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 12
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.92	6.71							
08-13-94	2	900	25.1	6.85	5.69							
08-14-94	3	900	25.1	6.95	5.44							
08-15-94	4	900	23.9	6.80	5.56							
08-16-94	5	1000	23.9	6.90	5.98							
08-17-94	6	1000	24.9	7.00	5.34							
08-18-94	7	900	24.8	6.78	4.56	40.8	68.4	905	0.00	0.00	0.621	0.00209
08-19-94	8	800	24.2	6.72	5.09							
08-20-94	9	1000	25.1	6.76	5.88							
08-21-94	10	800	25.4	6.70	5.67							
08-22-94	11	900	24.2	6.68	5.26							
08-23-94	12	730	22.7	6.74	6.24							
08-24-94	13	1000	23.9	6.54	6.32							
08-25-94	14	1100	23.7	6.70	6.07	54.4	119.7	736	0.00	0.00	0.088	0.00023
08-26-94	15	900	24.1	6.70	5.65							
08-27-94	16	900	23.9	6.77	5.49							
08-28-94	17	800	24.4	6.82	5.51							
08-29-94	18	900	25.2	6.85	4.93							
08-30-94	19	900	22.4	6.73	5.34							
08-31-94	20	800	24.2	6.98	6.21							
09-01-94	21	1100	24.5	6.83	5.90	61.2	119.7	531	0.00	0.00	a	a
09-02-94	22	900	23.4	6.77	5.35							
09-03-94	23	815	24.4	6.83	5.89							
09-04-94	24	810	24.1	6.95	5.74							
09-05-94	25	1100	24.3	6.68	6.31							
09-06-94	26	900	24.3	6.69	6.31							
09-07-94	27	800	23.8	6.74	6.44							
09-08-94	28	1100	23.7	6.86	6.32	68.0	136.8	593	0.00	0.00	0.025	0.00009
09-09-94	29	900	23.6	6.83	6.80							
09-10-94	30	900	24.1	6.83	6.20							
09-11-94	31	800	22.8	6.85	5.99							
09-12-94	32	500	23.7	7.05	6.39							

09-13-94	33	700	23.9	6.92	6.53							
09-14-94	34	1400	26.8	6.95	4.43							
09-15-94	35	1300	26.2	7.06	6.53							
09-16-94	36	1200	25.6	6.65	5.05	40.8	119.7	838	0.00	0.00	0.090	0.00024
09-17-94	37	820	25.4	6.67	5.22							
09-18-94	38	830	25.5	6.81	4.82							
09-19-94	39	1000	24.4	6.91	5.46							
09-20-94	40	1000	23.9	6.83	5.37							
09-21-94	41	1000	25.7	6.84	5.50							
09-22-94	42	900	24.5	6.83	5.72	68.0	119.7	705	0.00	0.00	a	a
09-23-94	43	1000	24.3	6.71	6.45							
09-24-94	44	845	24.0	6.69	6.04							
09-25-94	45	1300	25.4	a	5.80							
09-26-94	46	900	26.4	6.70	3.81							
09-27-94	47	800	25.0	6.60	5.45							
09-28-94	48	1000	24.3	6.61	5.55	47.6	119.7	873	a	a	a	a
09-29-94	49	1030	26.1	6.85	2.94							
09-30-94	50	1030	22.8	6.74	6.66							
10-01-94	51	900	23.4	6.91	6.42							
10-02-94	52	915	22.8	6.76	6.18							
10-03-94	53	1100	21.4	6.77	6.43							
10-04-94	54	1100	22.6	6.79	6.69							
10-05-94	55	1000	23.7	6.82	6.55							
10-06-94	56	800	22.4	6.86	6.91	68.0	119.7	781	0.00	0.00	a	a
10-07-94	57	1100	23.4	6.82	7.41						0.033	0.00011
10-08-94	58	1100	24.2	6.80	7.23							
10-09-94	59	1100	26.9	6.77	5.61							
10-10-94	60	1000	24.4	6.75	5.53							
10-11-94	61	1600	25.3	6.95	5.37							
10-12-94	62	900	21.8	6.88	7.70							
10-13-94	63	1300	24.0	6.78	6.94	47.6	290.7	>1999	0.00	0.00	a	a
10-14-94	64	1300	24.3	6.71	6.07							
10-15-94	65	900	24.3	6.80	6.32							
10-16-94	66	900	23.4	6.52	7.19							
10-17-94	67	1000	22.9	6.75	7.12							
10-18-94	68	800	23.2	6.49	6.67							
10-19-94	69	900	24.0	6.55	6.99							
10-20-94	70	900	24.1	6.55	5.85	34.0	495.9	>1999	0.00	0.00	0.035	0.00007
10-21-94	71	900	22.2	6.66	6.68							
10-22-94	72	800	22.4	6.70	6.49							
10-23-94	73	900	23.3	6.63	6.64							
10-24-94	74	900	21.9	6.64	6.13							
10-25-94	75	900	22.7	6.64	6.40							
10-26-94	76	800	21.9	6.70	6.95							

10-27-94	77	1100	21.6	6.71	7.50	54.4	136.8	829	0.00	0.00	0.083	0.00019
10-28-94	78	1000	21.3	6.80	7.80							
10-29-94	79	900	21.3	6.84	7.81							
10-30-94	80	900	21.8	6.78	7.78							
10-31-94	81	1000	22.8	6.73	7.20							
11-01-94	82	1100	25.1	6.72	5.67							
11-02-94	83	1000	22.3	6.72	7.07							
11-03-94	84	1000	21.6	6.71	6.82							
11-04-94	85	1000	22.3	6.76	6.61	68.0	171.0	956	0.00	0.00	0.210	0.00056
11-05-94	86	1000	22.9	6.78	7.63							
11-06-94	87	1000	24.4	6.72	6.61							
11-07-94	88	700	22.3	6.71	7.49							
11-08-94	89	1000	20.8	6.80	8.44							
11-09-94	90	1000	22.3	6.69	7.58							
11-10-94	91	1100	22.5	6.78	6.98							
11-11-94	92	900	19.5	6.73	7.79	54.4	171.0	926	0.00	0.00	0.075	0.00015
11-12-94	93	845	18.9	6.69	8.19							
11-13-94	94	830	21.2	6.74	7.81							
11-14-94	95	1000	21.8	6.68	7.35							
11-15-94	96	900	22.3	6.67	7.29							
11-16-94	97	900	21.9	6.72	6.75	54.4	136.8	1101	0.00	0.00	0.055	0.00013
11-17-94	98	900	21.4	6.76	7.30							
11-18-94	99	900	24.6	6.59	7.11							
11-19-94	100	800	23.2	6.64	6.65							
11-20-94	101	900	23.0	6.72	7.00							
11-21-94	102	600	22.1	6.71	7.29							
11-22-94	103	600	23.5	6.70	6.93							
11-23-94	104	800	19.3	6.68	8.36	47.6	119.7	>1999	0.00	0.00	0.071	0.00013
11-24-94	105	730	23.0	6.68	8.55							
11-25-94	106	1020	22.7	6.93	9.40							
11-26-94	107	1000	20.2	6.67	10.21							
11-27-94	108	900	20.2	6.60	8.96							
11-28-94	109	900	22.0	6.61	8.79							
11-29-94	110	900	21.4	6.58	8.48							
11-30-94	111	900	21.4	6.56	8.28							
12-01-94	112	900	20.9	6.55	8.54	47.6	102.6	406	0.00	0.00	0.110	0.00017
12-02-94	113	1000	21.1	6.70	9.17							
12-03-94	114	1000	20.9	6.65	8.42							
12-04-94	115	1100	22.3	6.62	7.77							
12-05-94	116	900	24.0	6.60	6.98							
12-06-94	117	900	22.8	6.72	7.21							
12-07-94	118	800	22.4	6.72	7.95							
12-08-94	119	1100	25.7	6.70	5.66	54.4	102.6	447	0.00	0.00	0.088	0.00026
12-09-94	120	1000	21.8	6.77	7.19							

12-10-94	121	1300	21.8	6.75	7.92							
12-11-94	122	900	31.0	6.62	2.63							
12-12-94	123	900	24.3	7.38	8.06							
12-13-94	124	900	24.1	7.41	8.41							
12-14-94	125	900	24.0	7.36	8.44							
12-15-94	126	800	20.4	6.79	9.57	47.6	427.5	>1999	0.00	0.00	0.073	0.00018
12-16-94	127	1100	21.5	6.71	8.56							
12-17-94	128	845	21.8	6.69	8.37							
12-18-94	129	930	21.9	6.67	7.74							
12-19-94	130	1000	22.0	6.62	7.54							
12-20-94	131	1100	21.6	6.67	7.95							
12-21-94	132	1000	18.5	6.65	9.44	54.4	273.6	1891	0.00	0.00	0.100	0.00016
12-22-94	133	800	27.5	6.94	6.26							
12-23-94	134	1000	27.9	6.74	5.01							
12-24-94	135	900	27.6	7.00	6.38							
12-25-94	136	700	24.5	7.55	7.95							
12-26-94	137	1000	24.9	7.39	7.93							
12-27-94	138	1100	20.2	6.72	8.52							
12-28-94	139	1000	20.4	6.74	9.27							
12-29-94	140	900	19.8	6.62	8.31	47.6	205.2	1063	0.00	0.00	0.067	0.00011
12-30-94	141	1000	27.6	6.78	6.18							
12-31-94	142	1000	27.8	6.96	2.91							
01-01-95	143	1100	20.9	6.74	8.42							
01-02-95	144	1000	20.7	6.74	8.14							
01-03-95	145	1100	21.7	6.72	7.36							
01-04-95	146	900	18.9	6.81	9.28							
01-05-95	147	1100	25.9	7.13	4.82	68.0	102.6	520	0.00	0.00	0.028	0.00023
01-06-95	148	1000	23.7	7.43	8.40							
01-07-95	149	1130	24.3	7.51	8.99							
01-08-95	150	1030	24.2	7.45	8.83							
01-09-95	151	1000	24.0	7.41	9.33							
01-10-95	152	1000	19.7	6.61	9.45							
01-11-95	153	1000	20.2	6.70	8.53							
01-12-95	154	1100	20.6	6.55	8.10	47.6	102.6	415	0.00	0.00	0.017	0.00002
01-13-95	155	1000	21.0	6.30	7.99							
01-14-95	156	900	22.2	6.65	7.24							
01-15-95	157	800	24.7	6.81	6.46							
01-16-95	158	1030	23.7	6.74	6.59							
01-17-95	159	1000	22.6	6.74	7.94							
01-18-95	160	1000	23.0	6.92	6.70							
01-19-95	161	1000	22.7	7.04	8.04	54.4	564.3	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.1	6.65	7.83							
01-21-95	163	1000	23.5	6.62	7.02							
01-22-95	164	1100	22.2	6.81	7.82							

01-23-95	165	600	20.1	6.67	9.01							
01-24-95	166	1000	21.3	6.72	9.42							
01-25-95	167	1100	23.6	6.63	6.03							
01-26-95	168	1000	21.1	6.70	7.07	47.6	102.6	341	0.00	0.00	0.019	0.00004
01-27-95	169	1000	18.6	6.61	9.17							
01-28-95	170	830	19.4	6.69	8.58							
01-29-95	171	900	22.2	6.66	8.22							
01-30-95	172	1000	19.0	6.78	9.06							
01-31-95	173	1000	20.2	7.38	8.68							
02-01-95	174	1000	18.4	6.86	9.54							
02-02-95	175	900	19.7	6.68	8.45	54.4	136.8	646	0.00	0.00	0.083	0.00015
02-03-95	176	930	25.9	6.76	3.55							
02-04-95	177	1000	18.4	6.89	10.12							
02-05-95	178	1200	24.9	6.77	4.28							
02-06-95	179	930	21.8	7.32	8.62							
02-07-95	180	900	22.3	7.28	8.58							
02-08-95	181	900	22.3	7.23	9.13							
02-09-95	182	900	21.7	7.17	9.46	47.6	85.5	253	0.00	0.00	0.010	0.00007
02-10-95	183	900	21.8	7.08	9.18							
02-11-95	184	900	21.4	7.03	9.67							
02-12-95	185	1200	21.2	6.92	9.90							
02-13-95	186	900	21.1	7.01	9.89							
02-14-95	187	900	21.1	6.99	9.69							
02-15-95	188	900	21.3	6.97	9.65							
02-16-95	189	900	21.3	6.98	9.78	40.8	102.6	248	0.00	0.00	0.027	0.00011
02-17-95	190	900	22.9	6.98	9.30							
02-18-95	191	1100	23.2	6.98	9.69							
02-19-95	192	1400	23.6	6.96	9.43							
02-20-95	193	1000	23.4	6.93	9.26							
02-21-95	194	1000	23.4	7.01	9.38							
02-22-95	195	900	23.5	7.00	9.19							
02-23-95	196	1000	24.2	7.00	9.18	34.0	85.5	254	0.00	0.00	0.054	0.00030
02-24-95	197	1000	23.9	6.98	8.94							
02-25-95	198	1000	24.0	7.03	9.06							
02-26-95	199	1800	24.1	7.08	9.16							
02-27-95	200	900	24.0	7.04	8.99							
02-28-95	201	900	24.3	6.98	8.98							
03-01-95	202	900	24.3	6.95	8.91							
03-02-95	203	900	24.2	7.01	8.80	34.0	85.5	349	0.00	0.00	0.015	0.00008
03-03-95	204	900	24.0	7.01	8.78							
03-04-95	205	1000	23.3	6.98	8.79							
03-05-95	206	1015	23.5	7.00	8.82							
03-06-95	207	900	23.3	6.99	8.97							
03-07-95	208	900	23.6	6.98	8.69							

03-08-95	209	900	23.4	6.99	8.66							
03-09-95	210	1000	23.5	7.00	8.52	40.8	85.5	250	0.00	0.00	0.015	0.00008
03-10-95	211	900	24.6	6.97	8.41							
03-11-95	212	1100	24.6	6.93	8.52							
03-12-95	213	1800	25.3	6.96	8.35							
03-13-95	214	900	24.5	6.98	8.28							
03-14-95	215	900	24.7	6.89	8.70							
03-15-95	216	900	24.3	6.96	8.71							
03-16-95	217	900	25.6	6.85	8.67	47.6	85.5	221	0.00	0.00	0.011	0.00004
03-17-95	218	900	25.6	6.95	8.58							
03-18-95	219	1000	25.5	6.99	8.25							
03-19-95	220	1600	26.0	6.96	8.22							
03-20-95	221	900	25.0	6.96	8.34							
03-21-95	222	900	25.7	6.94	8.16							
03-22-95	223	900	25.5	7.00	8.65							
03-23-95	224	1100	25.5	6.96	8.29	47.6	85.5	241	0.00	0.00	a	a
03-24-95	225	900	25.3	6.94	7.54							
03-25-95	226	915	25.4	7.01	7.96							
03-26-95	227	900	25.1	7.10	8.69							
03-27-95	228	900	25.4	6.93	8.07							
03-28-95	229	900	25.3	6.95	7.86							
03-29-95	230	900	25.1	6.97	7.74							
03-30-95	231	900	25.3	6.95	7.47	47.6	85.5	226	0.00	0.00	0.070	0.00029
03-31-95	232	900	25.2	6.97	7.43							
04-01-95	233	900	25.1	7.02	7.80							
04-02-95	234	1000	25.1	7.00	7.19							
04-03-95	235	900	24.9	6.97	8.04							
04-04-95	236	900	25.4	7.04	7.74							
04-05-95	237	900	24.4	6.99	7.74							
04-06-95	238	900	25.0	7.01	7.97	40.8	85.5	236	0.00	0.00	0.050	0.00020
04-07-95	239	900	25.4	6.98	7.74							
04-08-95	240	1100	25.5	7.00	7.93							
04-09-95	241	1300	26.0	6.95	8.21							
04-10-95	242	900	25.5	6.98	7.42							
04-11-95	243	900	25.8	7.00	7.54							
04-12-95	244	900	26.0	7.00	7.30							
04-13-95	245	1100	25.9	7.02	7.40	40.8	85.5	255	0.00	0.00	0.038	0.00017
04-14-95	246	900	25.6	6.92	7.03							
04-15-95	247	1400	25.9	7.02	7.71							
04-16-95	248	1100	25.1	6.97	7.67							
04-17-95	249	900	25.0	6.95	7.64							
04-18-95	250	900	25.0	6.97	7.80							
04-19-95	251	900	25.4	6.99	7.97							
04-20-95	252	900	25.4	6.99	7.68	40.8	85.5	227	0.00	0.00	a	a

04-21-95	253	900	25.7	7.00	7.45							
04-22-95	254	1200	25.9	6.98	7.40							
04-23-95	255	2000	25.9	6.99	7.47							
04-24-95	256	900	25.1	7.02	7.37							
04-25-95	257	900	25.1	6.98	7.27							
04-26-95	258	900	24.9	7.02	7.21							
04-27-95	259	900	25.5	6.99	7.20	40.8	85.5	230	0.00	0.00	a	a
04-28-95	260	900	25.6	6.99	7.20							
04-29-95	261	1100	25.5	7.00	6.79							
04-30-95	262	1600	25.3	7.02	7.51							
05-01-95	263	900	25.6	7.02	7.98							
05-02-95	264	900	25.5	6.98	8.51							
05-03-95	265	900	25.4	7.02	7.42							
05-04-95	266	900	25.3	6.99	7.62	40.8	85.5	229	0.00	0.00	a	a
05-05-95	267	900	25.5	7.01	7.63							
05-06-95	268	830	25.4	6.94	7.46							
05-07-95	269	900	25.3	6.98	7.30							
05-08-95	270	900	25.4	6.98	7.38							
05-09-95	271	900	25.4	7.01	7.18							
05-10-95	272	900	26.0	7.01	7.41							
MEAN			23.6		7.41	49.4	149.9				0.078	0.00023
MINIMUM			18.4	6.30	2.63	34.0	68.4	221	0.00	0.00	0.010	0.00002
MAXIMUM			31.0	7.55	10.21	68.0	564.3	>1999	0.00	0.00	0.621	0.00209
Std Dev			1.98		1.393	9.58	112.91				0.1105	0.000367
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 13
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.48	6.91							
08-13-94	2	900	25.1	6.46	5.99							
08-14-94	3	900	25.0	6.51	5.88							
08-15-94	4	900	24.3	6.49	5.92							
08-16-94	5	1000	24.2	6.59	6.04							
08-17-94	6	1000	25.3	6.68	5.74							
08-18-94	7	900	25.0	6.52	5.48	34.0	85.5	807	0.00	0.00	0.354	0.00067
08-19-94	8	800	24.5	6.37	5.74							
08-20-94	9	1000	25.0	6.23	6.11							
08-21-94	10	800	25.2	6.12	5.97							
08-22-94	11	900	24.4	6.26	5.92							
08-23-94	12	730	23.3	6.35	6.53							
08-24-94	13	1000	24.1	5.84	6.41							
08-25-94	14	1100	24.0	6.15	6.46	40.8	119.7	676	0.00	0.00	0.078	0.00006
08-26-94	15	900	24.3	6.24	6.12							
08-27-94	16	900	24.2	6.38	5.86							
08-28-94	17	800	24.5	6.46	5.83							
08-29-94	18	900	25.1	6.48	5.47							
08-30-94	19	900	23.2	6.40	5.65							
08-31-94	20	800	24.1	6.57	6.43							
09-01-94	21	1100	24.3	6.42	6.39	47.6	102.6	518	0.00	0.00	a	a
09-02-94	22	900	23.6	6.43	5.94							
09-03-94	23	815	24.3	6.30	5.97							
09-04-94	24	810	24.0	6.53	6.19							
09-05-94	25	1100	24.4	6.01	6.54							
09-06-94	26	900	24.4	6.12	6.61							
09-07-94	27	800	23.9	6.23	6.69							
09-08-94	28	1100	23.8	6.46	6.62	54.4	102.6	574	0.00	0.00	0.008	0.00001
09-09-94	29	900	23.9	6.44	7.03							
09-10-94	30	900	24.4	6.46	6.50							
09-11-94	31	800	23.3	6.47	6.28							
09-12-94	32	500	24.1	6.63	6.56							

09-13-94	33	700	24.3	6.51	6.75							
09-14-94	34	1400	26.7	6.49	5.60							
09-15-94	35	1300	26.0	6.78	6.36							
09-16-94	36	1200	25.5	6.21	5.72	27.2	119.7	753	0.00	0.00	0.060	0.00006
09-17-94	37	820	25.4	6.19	5.84							
09-18-94	38	830	25.6	6.49	5.57							
09-19-94	39	1000	24.7	6.59	5.92							
09-20-94	40	1000	24.4	6.47	5.92							
09-21-94	41	1000	25.8	6.50	5.96							
09-22-94	42	900	24.7	6.49	6.05	54.4	119.7	662	0.00	0.00	a	a
09-23-94	43	1000	24.5	6.26	6.44							
09-24-94	44	845	24.3	6.31	6.08							
09-25-94	45	1300	25.3	a	6.00							
09-26-94	46	900	26.3	6.37	4.70							
09-27-94	47	900	25.0	6.07	5.80							
09-28-94	48	1000	24.3	6.09	5.30	34.0	119.7	826	a	a	a	a
09-29-94	49	1030	26.2	6.47	3.41							
09-30-94	50	1030	23.1	6.36	6.71							
10-01-94	51	900	23.6	6.50	6.24							
10-02-94	52	915	23.4	6.37	6.09							
10-03-94	53	1100	22.4	6.27	6.35							
10-04-94	54	1100	23.2	6.35	6.40							
10-05-94	55	1000	24.2	6.40	6.44							
10-06-94	56	800	23.2	6.44	6.53	54.4	119.7	717	0.00	0.00	a	a
10-07-94	57	1100	24.1	6.36	7.12						0.041	0.00005
10-08-94	58	1100	24.7	6.38	7.19							
10-09-94	59	1100	26.7	6.34	5.98							
10-10-94	60	1000	24.9	6.40	5.84							
10-11-94	61	1600	25.3	6.76	4.24							
10-12-94	62	900	22.4	6.44	7.33							
10-13-94	63	1300	24.4	6.33	6.84	40.8	239.4	1770	0.00	0.00	a	a
10-14-94	64	1300	24.8	6.32	6.16							
10-15-94	65	900	24.8	6.44	6.47							
10-16-94	66	900	24.1	5.95	7.18							
10-17-94	67	1000	23.8	6.33	7.11							
10-18-94	68	800	24.2	6.04	6.66							
10-19-94	69	900	24.5	5.98	7.07							
10-20-94	70	900	24.1	6.10	6.22	27.2	393.3	>1999	0.00	0.00	0.058	0.00004
10-21-94	71	900	22.1	6.26	6.96							
10-22-94	72	800	22.9	6.31	6.49							
10-23-94	73	900	22.8	6.16	7.37							
10-24-94	74	900	21.7	6.26	6.82							
10-25-94	75	900	22.9	6.20	6.37							
10-26-94	76	800	21.1	6.30	6.66							

10-27-94	77	1100	21.1	6.33	7.08	40.8	119.7	728	0.00	0.00	0.074	0.00007
10-28-94	78	1000	20.6	6.40	7.40							
10-29-94	79	900	20.8	6.33	7.35							
10-30-94	80	900	21.3	6.34	7.38							
10-31-94	81	1000	22.3	6.36	6.92							
11-01-94	82	1100	25.1	6.34	5.65							
11-02-94	83	1000	22.0	6.29	6.90							
11-03-94	84	1000	21.3	6.36	6.44							
11-04-94	85	1000	22.1	6.41	6.36	54.4	153.9	842	0.00	0.00	0.190	0.00023
11-05-94	86	1000	22.5	6.37	7.32							
11-06-94	87	1000	24.2	6.30	6.65							
11-07-94	88	700	22.0	6.36	7.12							
11-08-94	89	1000	20.7	6.40	7.67							
11-09-94	90	1000	22.0	6.36	7.05							
11-10-94	91	1100	22.2	6.38	6.65							
11-11-94	92	900	19.4	6.30	7.17	40.8	136.8	710	0.00	0.00	0.085	0.00006
11-12-94	93	845	18.8	6.28	7.48							
11-13-94	94	830	20.8	6.37	7.53							
11-14-94	95	1000	21.6	6.28	6.90							
11-15-94	96	900	22.1	6.20	6.89							
11-16-94	97	900	21.9	6.30	6.37	40.8	119.7	921	0.00	0.00	0.059	0.00005
11-17-94	98	900	21.7	6.34	6.81							
11-18-94	99	900	24.5	6.00	6.70							
11-19-94	100	800	23.2	6.15	6.26							
11-20-94	101	900	22.9	6.32	6.55							
11-21-94	102	600	22.3	6.31	6.76							
11-22-94	103	600	23.9	6.20	6.63							
11-23-94	104	800	20.0	6.29	7.71	40.8	102.6	1587	0.00	0.00	0.056	0.00004
11-24-94	105	730	23.3	6.30	7.93							
11-25-94	106	1020	22.8	6.28	8.67							
11-26-94	107	1000	21.0	6.31	9.02							
11-27-94	108	900	21.1	6.23	8.01							
11-28-94	109	900	22.5	6.06	7.99							
11-29-94	110	900	22.0	6.16	7.59							
11-30-94	111	900	22.1	6.19	7.48							
12-01-94	112	900	21.5	6.15	7.72	34.0	85.5	425	0.00	0.00	0.100	0.00006
12-02-94	113	1000	22.4	6.31	8.21							
12-03-94	114	1000	22.3	6.26	7.48							
12-04-94	115	1100	23.5	6.29	7.03							
12-05-94	116	900	25.1	6.20	6.46							
12-06-94	117	900	24.0	6.26	6.63							
12-07-94	118	800	23.8	6.27	7.26							
12-08-94	119	1100	26.3	6.40	5.58	40.8	102.6	470	0.00	0.00	0.080	0.00012
12-09-94	120	1000	23.7	6.41	6.71							

12-10-94	121	1300	23.7	6.35	7.19							
12-11-94	122	900	31.2	6.40	3.24							
12-12-94	123	900	24.8	6.82	7.51							
12-13-94	124	900	24.7	6.92	7.70							
12-14-94	125	900	24.6	6.89	7.77							
12-15-94	126	800	23.0	6.34	8.56	34.0	359.1	>1999	0.00	0.00	0.086	0.00009
12-16-94	127	1100	24.2	6.26	7.62							
12-17-94	128	845	24.3	6.29	7.58							
12-18-94	129	930	24.3	6.30	7.13							
12-19-94	130	1000	24.7	6.27	7.02							
12-20-94	131	1100	24.3	6.40	7.45							
12-21-94	132	1000	20.6	6.30	8.49	40.8	239.4	1604	0.00	0.00	0.100	0.00008
12-22-94	133	800	28.3	6.65	5.86							
12-23-94	134	1000	28.5	6.48	4.76							
12-24-94	135	900	28.6	6.68	5.91							
12-25-94	136	700	25.9	7.01	7.28							
12-26-94	137	1000	26.1	6.92	7.04							
12-27-94	138	1100	22.7	6.32	7.70							
12-28-94	139	1000	22.8	6.30	8.31							
12-29-94	140	900	22.2	6.29	7.50	40.8	171.0	1004	0.00	0.00	0.083	0.00008
12-30-94	141	1000	28.7	6.43	5.74							
12-31-94	142	1000	28.6	6.73	2.97							
01-01-95	143	1100	23.1	6.38	7.37							
01-02-95	144	1000	22.7	6.35	7.29							
01-03-95	145	1100	23.7	6.37	6.48							
01-04-95	146	900	21.4	6.38	8.08							
01-05-95	147	1100	26.2	6.79	4.66	54.4	102.6	500	0.00	0.00	0.025	0.00010
01-06-95	148	1000	24.2	6.91	7.44							
01-07-95	149	1130	24.9	6.65	8.18							
01-08-95	150	1030	24.3	6.93	8.18							
01-09-95	151	1000	24.4	6.88	8.48							
01-10-95	152	1000	21.7	6.20	8.42							
01-11-95	153	1000	21.6	6.28	7.85							
01-12-95	154	1100	22.1	6.16	7.46	34.0	102.6	424	0.00	0.00	0.031	0.00002
01-13-95	155	1000	22.0	6.06	7.48							
01-14-95	156	900	22.9	6.30	6.87							
01-15-95	157	800	25.3	6.50	6.23							
01-16-95	158	1030	24.2	6.35	6.43							
01-17-95	159	1000	24.4	6.40	7.38							
01-18-95	160	1000	24.7	6.71	6.32							
01-19-95	161	1000	24.4	6.63	7.02	54.4	444.6	>1999	0.00	0.00	a	a
01-20-95	162	1000	24.9	6.15	6.87							
01-21-95	163	1000	25.3	6.21	5.91							
01-22-95	164	1100	24.2	6.48	6.63							

01-23-95	165	600	22.8	6.31	7.78							
01-24-95	166	1000	23.1	6.30	7.82							
01-25-95	167	1100	24.7	6.36	5.23							
01-26-95	168	1000	21.2	6.30	7.39	34.0	102.6	373	0.00	0.00	0.022	0.00002
01-27-95	169	1000	21.4	6.20	7.58							
01-28-95	170	830	22.0	6.33	7.35							
01-29-95	171	900	24.2	6.30	7.04							
01-30-95	172	1000	21.8	6.43	7.75							
01-31-95	173	1000	21.2	6.92	7.68							
02-01-95	174	1000	20.1	6.47	8.24							
02-02-95	175	900	21.3	6.40	7.50	40.8	136.8	615	0.00	0.00	0.100	0.00011
02-03-95	176	930	26.2	6.54	2.78							
02-04-95	177	1000	19.6	6.54	8.87							
02-05-95	178	1200	25.2	6.64	3.76							
02-06-95	179	930	22.3	6.87	7.59							
02-07-95	180	900	22.7	6.86	7.48							
02-08-95	181	900	22.7	6.68	7.84							
02-09-95	182	900	21.9	6.56	8.26	40.8	85.5	297	0.00	0.00	0.012	0.00002
02-10-95	183	900	22.3	6.53	7.84							
02-11-95	184	900	21.8	6.36	8.36							
02-12-95	185	1200	21.7	6.18	8.52							
02-13-95	186	900	21.6	6.46	8.55							
02-14-95	187	900	21.6	6.34	8.24							
02-15-95	188	900	21.3	6.23	8.52							
02-16-95	189	900	21.9	6.20	8.41	34.0	85.5	296	0.00	0.00	0.028	0.00002
02-17-95	190	900	23.0	6.28	8.21							
02-18-95	191	1100	23.1	6.22	8.81							
02-19-95	192	1400	23.5	6.17	8.51							
02-20-95	193	1000	23.2	6.30	8.26							
02-21-95	194	1000	23.2	6.25	8.34							
02-22-95	195	900	23.3	6.34	8.18							
02-23-95	196	1000	24.1	6.33	8.24	27.2	85.5	294	0.00	0.00	0.052	0.00006
02-24-95	197	1000	23.8	6.33	8.03							
02-25-95	198	1000	24.1	6.34	8.15							
02-26-95	199	1800	24.0	6.41	8.32							
02-27-95	200	900	24.1	6.28	8.05							
02-28-95	201	900	24.3	6.38	7.97							
03-01-95	202	900	24.3	6.39	7.99							
03-02-95	203	900	24.1	6.39	8.00	27.2	85.5	371	0.00	0.00	0.014	0.00002
03-03-95	204	900	23.7	6.35	7.86							
03-04-95	205	1000	22.7	6.37	7.93							
03-05-95	206	1015	22.8	6.42	8.00							
03-06-95	207	900	22.8	6.34	7.95							
03-07-95	208	900	22.8	6.28	7.79							

03-08-95	209	900	22.7	6.37	7.75							
03-09-95	210	1000	23.1	6.35	7.71	34.0	85.5	292	0.00	0.00	0.014	0.00002
03-10-95	211	900	24.8	6.32	7.29							
03-11-95	212	1100	24.0	6.30	7.69							
03-12-95	213	1800	24.8	6.30	7.46							
03-13-95	214	900	24.0	6.30	7.45							
03-14-95	215	900	24.0	6.30	7.91							
03-15-95	216	900	23.2	6.28	7.86							
03-16-95	217	900	24.6	6.29	7.85	34.0	85.5	268	0.00	0.00	0.012	0.00001
03-17-95	218	900	24.7	6.30	7.65							
03-18-95	219	1000	24.8	6.32	7.52							
03-19-95	220	1600	25.6	6.34	7.64							
03-20-95	221	900	24.5	6.31	7.54							
03-21-95	222	900	24.8	6.28	7.42							
03-22-95	223	900	24.6	6.27	7.61							
03-23-95	224	1100	24.7	6.31	7.41	40.8	85.5	291	0.00	0.00	a	a
03-24-95	225	900	24.6	6.31	6.47							
03-25-95	226	915	24.7	6.37	7.01							
03-26-95	227	900	24.5	6.38	7.57							
03-27-95	228	900	24.7	6.29	7.06							
03-28-95	229	900	24.6	6.29	6.67							
03-29-95	230	900	24.5	6.30	6.61							
03-30-95	231	900	24.6	6.33	6.59	40.8	85.5	277	0.00	0.00	0.061	0.00006
03-31-95	232	900	24.5	6.35	6.57							
04-01-95	233	900	24.5	6.41	6.98							
04-02-95	234	1000	24.2	6.39	7.31							
04-03-95	235	900	24.0	6.34	7.08							
04-04-95	236	900	24.6	6.39	6.84							
04-05-95	237	900	23.1	6.31	6.91							
04-06-95	238	900	24.3	6.38	6.98	34.0	85.5	285	0.00	0.00	0.054	0.00005
04-07-95	239	900	24.6	6.39	6.70							
04-08-95	240	1100	24.8	6.37	6.98							
04-09-95	241	1300	25.2	6.36	7.35							
04-10-95	242	900	24.8	6.32	6.33							
04-11-95	243	900	25.1	6.39	7.04							
04-12-95	244	900	25.6	6.39	6.78							
04-13-95	245	1100	25.5	6.41	6.92	34.0	85.5	300	0.00	0.00	0.043	0.00005
04-14-95	246	900	25.1	6.37	6.69							
04-15-95	247	1400	25.6	6.42	7.40							
04-16-95	248	1100	24.7	6.34	7.45							
04-17-95	249	900	24.6	6.41	7.24							
04-18-95	250	900	24.4	6.39	7.54							
04-19-95	251	900	24.9	6.44	7.70							
04-20-95	252	900	24.9	6.37	7.42	34.0	68.4	275	0.00	0.00	a	a

04-21-95	253	900	25.1	6.43	7.15							
04-22-95	254	1200	25.5	6.42	7.32							
04-23-95	255	2000	25.3	6.40	7.40							
04-24-95	256	900	24.5	6.49	7.18							
04-25-95	257	900	24.6	6.40	6.96							
04-26-95	258	900	24.4	6.46	6.96							
04-27-95	259	900	24.9	6.44	6.97	34.0	85.5	276	0.00	0.00	a	a
04-28-95	260	900	25.2	6.41	7.19							
04-29-95	261	1100	25.3	6.42	6.89							
04-30-95	262	1600	24.3	6.41	7.58							
05-01-95	263	900	25.3	6.45	7.50							
05-02-95	264	900	25.2	6.45	8.14							
05-03-95	265	900	25.0	6.46	7.21							
05-04-95	266	900	24.9	6.48	7.34	34.0	85.5	284	0.00	0.00	a	a
05-05-95	267	900	25.1	6.46	7.43							
05-06-95	268	830	24.5	6.48	7.48							
05-07-95	269	900	24.4	6.51	7.56							
05-08-95	270	900	24.9	6.44	7.35							
05-09-95	271	900	24.8	6.52	7.26							
05-10-95	272	900	25.5	6.33	7.17							
MEAN			23.9		6.98	39.2	134.1				0.068	0.00008
MINIMUM			18.8	5.84	2.78	27.2	68.4	268	0.00	0.00	0.008	0.00001
MAXIMUM			31.2	7.01	9.02	54.4	444.6	>1999	0.00	0.00	0.354	0.00067
Std Dev			1.63		0.981	8.02	86.44				0.0658	0.000120
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 14
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.5	6.48	6.82							
08-13-94	2	900	25.0	6.46	5.87							
08-14-94	3	900	25.0	6.51	5.70							
08-15-94	4	900	24.2	6.49	5.78							
08-16-94	5	1000	24.1	6.58	6.00							
08-17-94	6	1000	25.2	6.68	5.66							
08-18-94	7	900	25.0	6.50	5.48	34.0	85.5	808	0.00	0.00	0.489	0.00088
08-19-94	8	800	24.4	6.36	5.55							
08-20-94	9	1000	24.9	6.23	6.01							
08-21-94	10	800	25.2	6.11	5.87							
08-22-94	11	900	24.2	6.26	5.70							
08-23-94	12	730	23.1	6.35	6.36							
08-24-94	13	1000	23.9	5.84	6.50							
08-25-94	14	1100	23.8	6.15	6.49	40.8	119.7	682	0.00	0.00	0.073	0.00005
08-26-94	15	900	24.2	6.24	6.06							
08-27-94	16	900	24.0	6.38	5.84							
08-28-94	17	800	24.3	6.46	5.81							
08-29-94	18	900	25.0	6.48	5.43							
08-30-94	19	900	23.0	6.40	5.62							
08-31-94	20	800	24.0	6.57	6.35							
09-01-94	21	1100	24.2	6.41	6.28	47.6	136.8	509	0.00	0.00	a	a
09-02-94	22	900	23.4	6.43	5.85							
09-03-94	23	815	24.3	6.25	6.09							
09-04-94	24	810	24.0	6.52	6.07							
09-05-94	25	1100	24.1	6.01	6.56							
09-06-94	26	900	24.2	6.10	6.63							
09-07-94	27	800	23.7	6.22	6.64							
09-08-94	28	1100	24.1	6.47	6.48	54.4	102.6	570	0.00	0.00	0.052	0.00008
09-09-94	29	900	23.9	6.44	6.89							
09-10-94	30	900	24.2	6.46	6.35							
09-11-94	31	800	23.2	6.47	6.24							
09-12-94	32	500	23.9	6.63	6.55							

09-13-94	33	700	24.1	6.50	6.77							
09-14-94	34	1400	26.6	6.49	5.43							
09-15-94	35	1300	25.9	6.77	6.53							
09-16-94	36	1200	25.3	6.21	5.54	27.2	102.6	755	0.00	0.00	0.053	0.00005
09-17-94	37	820	25.4	6.11	5.67							
09-18-94	38	830	25.5	6.42	5.39							
09-19-94	39	1000	24.5	6.59	5.93							
09-20-94	40	1000	24.1	6.45	5.98							
09-21-94	41	1000	25.5	6.50	6.05							
09-22-94	42	900	24.4	6.49	6.12	54.4	119.7	655	0.00	0.00	a	a
09-23-94	43	1000	24.3	6.24	6.71							
09-24-94	44	845	24.1	6.29	6.31							
09-25-94	45	1300	25.1	a	6.21							
09-26-94	46	900	26.1	6.36	4.95							
09-27-94	47	800	24.8	6.07	5.96							
09-28-94	48	1000	24.3	6.09	5.34	34.0	102.6	787	a	a	a	a
09-29-94	49	1030	26.2	6.46	3.51							
09-30-94	50	1030	23.1	6.33	6.66							
10-01-94	51	900	23.6	6.48	6.24							
10-02-94	52	915	23.3	6.34	5.96							
10-03-94	53	1100	22.2	6.27	6.34							
10-04-94	54	1100	23.0	6.35	6.47							
10-05-94	55	1000	24.0	6.40	6.40							
10-06-94	56	800	23.0	6.44	6.51	54.4	119.7	726	0.00	0.00	a	a
10-07-94	57	1100	23.9	6.33	7.08						0.043	0.00005
10-08-94	58	1100	24.5	6.35	7.06							
10-09-94	59	1100	26.7	6.30	5.87							
10-10-94	60	1000	24.6	6.40	5.72							
10-11-94	61	1600	25.1	6.78	5.44							
10-12-94	62	900	22.0	6.44	7.41							
10-13-94	63	1300	24.1	6.33	6.84	40.8	239.4	1699	0.00	0.00	a	a
10-14-94	64	1300	24.5	6.32	6.20							
10-15-94	65	900	24.5	6.44	6.51							
10-16-94	66	900	23.6	5.90	7.31							
10-17-94	67	1000	23.2	6.33	7.26							
10-18-94	68	800	23.6	5.94	6.92							
10-19-94	69	900	24.2	5.95	7.19							
10-20-94	70	900	23.5	6.05	6.35	27.2	427.5	>1999	0.00	0.00	0.040	0.00002
10-21-94	71	900	21.3	6.24	7.36							
10-22-94	72	800	21.7	6.31	7.15							
10-23-94	73	900	23.5	6.15	6.37							
10-24-94	74	900	21.6	6.26	6.46							
10-25-94	75	900	22.0	6.20	6.37							
10-26-94	76	800	21.3	6.30	6.68							

10-27-94	77	1100	21.2	6.33	7.04	40.8	136.8	764	0.00	0.00	0.076	0.00007
10-28-94	78	1000	20.8	6.40	7.30							
10-29-94	79	900	21.0	6.33	7.29							
10-30-94	80	900	21.5	6.34	7.30							
10-31-94	81	1000	22.4	6.36	6.89							
11-01-94	82	1100	25.2	6.34	5.60							
11-02-94	83	1000	22.1	6.29	6.82							
11-03-94	84	1000	21.4	6.36	6.41							
11-04-94	85	1000	22.2	6.41	6.34	54.4	153.9	846	0.00	0.00	0.190	0.00023
11-05-94	86	1000	22.6	6.37	7.35							
11-06-94	87	1000	24.3	6.31	6.67							
11-07-94	88	700	22.2	6.36	7.08							
11-08-94	89	1000	21.0	6.40	7.67							
11-09-94	90	1000	22.3	6.36	7.02							
11-10-94	91	1100	22.4	6.38	6.53							
11-11-94	92	900	20.0	6.30	7.03	40.8	153.9	827	0.00	0.00	0.100	0.00008
11-12-94	93	845	19.0	6.27	7.36							
11-13-94	94	830	21.2	6.34	7.34							
11-14-94	95	1000	21.8	6.28	6.82							
11-15-94	96	900	22.3	6.20	6.82							
11-16-94	97	900	22.0	6.30	6.31	40.8	119.7	956	0.00	0.00	0.073	0.00007
11-17-94	98	900	21.7	6.34	6.81							
11-18-94	99	900	24.5	6.00	6.60							
11-19-94	100	800	23.3	6.15	6.25							
11-20-94	101	900	23.0	6.32	6.54							
11-21-94	102	600	22.4	6.31	6.73							
11-22-94	103	600	24.0	6.20	6.52							
11-23-94	104	800	20.4	6.29	7.71	40.8	102.6	1680	0.00	0.00	0.100	0.00008
11-24-94	105	730	22.9	6.29	8.00							
11-25-94	106	1020	22.8	6.22	8.76							
11-26-94	107	1000	20.9	6.31	9.12							
11-27-94	108	900	20.8	6.23	8.13							
11-28-94	109	900	22.2	6.06	8.12							
11-29-94	110	900	21.7	6.16	7.69							
11-30-94	111	900	21.8	6.19	7.57							
12-01-94	112	900	21.2	6.15	7.89	34.0	85.5	413	0.00	0.00	0.110	0.00007
12-02-94	113	1000	22.1	6.28	8.30							
12-03-94	114	1000	21.7	6.25	7.73							
12-04-94	115	1100	23.1	6.29	7.28							
12-05-94	116	900	24.8	6.20	6.71							
12-06-94	117	900	23.4	6.26	6.87							
12-07-94	118	800	23.1	6.27	7.50							
12-08-94	119	1100	25.9	6.40	5.91	40.8	102.6	450	0.00	0.00	0.079	0.00012
12-09-94	120	1000	22.8	6.41	7.07							

12-10-94	121	1300	22.8	6.35	7.29							
12-11-94	122	900	31.2	6.40	2.91							
12-12-94	123	900	24.4	6.82	7.64							
12-13-94	124	900	24.5	6.92	7.83							
12-14-94	125	900	24.4	6.89	7.91							
12-15-94	126	800	22.4	6.34	8.64	34.0	359.1	>1999	0.00	0.00	0.089	0.00009
12-16-94	127	1100	23.6	6.26	7.71							
12-17-94	128	845	23.7	6.27	7.68							
12-18-94	129	930	24.1	6.28	7.17							
12-19-94	130	1000	23.9	6.27	7.14							
12-20-94	131	1100	23.6	6.40	7.62							
12-21-94	132	1000	20.2	6.30	8.60	40.8	239.4	1611	0.00	0.00	0.100	0.00008
12-22-94	133	800	27.7	6.65	6.07							
12-23-94	134	1000	27.8	6.48	5.35							
12-24-94	135	900	28.2	6.68	6.32							
12-25-94	136	700	25.4	6.99	7.55							
12-26-94	137	1000	25.9	6.92	7.34							
12-27-94	138	1100	22.2	6.32	7.82							
12-28-94	139	1000	22.3	6.30	8.47							
12-29-94	140	900	21.3	6.29	7.65	40.8	171.0	888	0.00	0.00	0.075	0.00006
12-30-94	141	1000	28.6	6.43	6.02							
12-31-94	142	1000	28.1	6.73	3.38							
01-01-95	143	1100	22.3	6.38	7.82							
01-02-95	144	1000	21.8	6.35	7.62							
01-03-95	145	1100	22.8	6.37	7.26							
01-04-95	146	900	19.9	6.38	8.61							
01-05-95	147	1100	26.1	6.79	4.85	54.4	102.6	495	0.00	0.00	0.051	0.00019
01-06-95	148	1000	23.6	6.90	7.74							
01-07-95	149	1130	24.6	6.69	8.27							
01-08-95	150	1030	24.2	6.92	8.16							
01-09-95	151	1000	24.1	6.88	8.52							
01-10-95	152	1000	20.9	6.20	8.61							
01-11-95	153	1000	21.0	6.28	7.91							
01-12-95	154	1100	21.6	6.16	7.30	34.0	119.7	416	0.00	0.00	0.033	0.00002
01-13-95	155	1000	21.7	6.06	7.37							
01-14-95	156	900	22.7	6.30	6.72							
01-15-95	157	800	25.4	6.50	6.04							
01-16-95	158	1030	24.2	6.35	6.36							
01-17-95	159	1000	23.7	6.40	7.41							
01-18-95	160	1000	23.8	6.71	6.44							
01-19-95	161	1000	23.3	6.63	7.53	54.4	444.6	>1999	0.00	0.00	a	a
01-20-95	162	1000	23.8	6.15	7.28							
01-21-95	163	1000	24.8	6.21	6.10							
01-22-95	164	1100	23.6	6.48	6.88							

01-23-95	165	600	22.1	6.31	7.98							
01-24-95	166	1000	23.1	6.30	8.10							
01-25-95	167	1100	24.2	6.36	5.54							
01-26-95	168	1000	22.0	6.30	7.16	34.0	85.5	363	0.00	0.00	0.023	0.00002
01-27-95	169	1000	20.4	6.20	7.98							
01-28-95	170	830	20.8	6.33	7.64							
01-29-95	171	900	23.3	6.30	7.24							
01-30-95	172	1000	20.6	6.43	8.11							
01-31-95	173	1000	20.7	6.92	8.04							
02-01-95	174	1000	19.5	6.47	8.36							
02-02-95	175	900	20.8	6.40	7.55	40.8	136.8	614	0.00	0.00	0.080	0.00008
02-03-95	176	930	26.1	6.54	2.75							
02-04-95	177	1000	18.6	6.54	9.29							
02-05-95	178	1200	24.9	6.64	4.07							
02-06-95	179	930	21.6	6.87	7.95							
02-07-95	180	900	22.2	6.86	7.89							
02-08-95	181	900	22.1	6.68	8.08							
02-09-95	182	900	21.4	6.56	8.59	40.8	85.5	292	0.00	0.00	0.013	0.00002
02-10-95	183	900	21.7	6.53	8.23							
02-11-95	184	900	21.2	6.36	8.65							
02-12-95	185	1200	21.1	6.18	8.90							
02-13-95	186	900	20.8	6.46	8.89							
02-14-95	187	900	20.8	6.34	8.75							
02-15-95	188	900	20.7	6.23	8.88							
02-16-95	189	900	20.9	6.20	8.88	34.0	85.5	289	0.00	0.00	0.028	0.00002
02-17-95	190	900	22.3	6.28	8.43							
02-18-95	191	1100	22.4	6.22	8.90							
02-19-95	192	1400	22.6	6.17	8.75							
02-20-95	193	1000	22.4	6.30	8.41							
02-21-95	194	1000	22.4	6.25	8.52							
02-22-95	195	900	22.2	6.34	8.32							
02-23-95	196	1000	23.3	6.33	8.37	27.2	85.5	291	0.00	0.00	0.051	0.00005
02-24-95	197	1000	22.8	6.33	8.15							
02-25-95	198	1000	23.5	6.34	8.20							
02-26-95	199	1800	23.3	6.41	8.42							
02-27-95	200	900	23.0	6.28	8.30							
02-28-95	201	900	23.6	6.38	8.26							
03-01-95	202	900	23.6	6.39	8.25							
03-02-95	203	900	23.5	6.39	8.24	27.2	85.5	368	0.00	0.00	0.014	0.00002
03-03-95	204	900	23.2	6.35	8.11							
03-04-95	205	1000	22.5	6.37	8.09							
03-05-95	206	1015	22.7	6.40	8.06							
03-06-95	207	900	22.6	6.34	8.08							
03-07-95	208	900	22.7	6.28	7.91							

03-08-95	209	900	22.6	6.37	7.87							
03-09-95	210	1000	22.8	6.35	7.78	34.0	85.5	293	0.00	0.00	0.015	0.00002
03-10-95	211	900	24.3	6.32	7.54							
03-11-95	212	1100	23.5	6.30	7.82							
03-12-95	213	1800	24.5	6.30	7.62							
03-13-95	214	900	23.6	6.30	7.55							
03-14-95	215	900	23.7	6.30	7.95							
03-15-95	216	900	23.0	6.28	7.98							
03-16-95	217	900	24.2	6.29	7.96	34.0	85.5	267	0.00	0.00	a	a
03-17-95	218	900	24.3	6.30	7.83							
03-18-95	219	1000	24.3	6.32	7.61							
03-19-95	220	1600	25.2	6.34	7.59							
03-20-95	221	900	24.0	6.31	7.62							
03-21-95	222	900	24.3	6.28	7.50							
03-22-95	223	900	24.2	6.27	7.70							
03-23-95	224	1100	24.2	6.31	7.49	40.8	85.5	291	0.00	0.00	a	a
03-24-95	225	900	24.1	6.31	6.91							
03-25-95	226	915	24.1	6.38	7.36							
03-26-95	227	900	24.7	6.36	7.67							
03-27-95	228	900	24.1	6.29	7.44							
03-28-95	229	900	23.9	6.29	7.20							
03-29-95	230	900	23.8	6.30	7.23							
03-30-95	231	900	24.0	6.33	7.01	40.8	85.5	277	0.00	0.00	0.066	0.00006
03-31-95	232	900	23.9	6.35	6.98							
04-01-95	233	900	23.7	6.40	7.44							
04-02-95	234	1000	23.8	6.36	7.85							
04-03-95	235	900	23.2	6.34	7.59							
04-04-95	236	900	23.7	6.39	7.40							
04-05-95	237	900	22.6	6.31	7.47							
04-06-95	238	900	23.3	6.38	7.52	34.0	85.5	282	0.00	0.00	0.055	0.00005
04-07-95	239	900	23.6	6.39	7.44							
04-08-95	240	1100	23.9	6.37	7.55							
04-09-95	241	1300	24.4	6.36	7.80							
04-10-95	242	900	23.9	6.32	7.03							
04-11-95	243	900	24.2	6.39	7.71							
04-12-95	244	900	24.6	6.39	7.67							
04-13-95	245	1100	24.6	6.41	7.67	34.0	85.5	300	0.00	0.00	0.042	0.00005
04-14-95	246	900	24.7	6.37	7.22							
04-15-95	247	1400	25.1	6.42	7.74							
04-16-95	248	1100	24.4	6.34	7.75							
04-17-95	249	900	24.2	6.41	7.60							
04-18-95	250	900	24.0	6.39	7.60							
04-19-95	251	900	24.5	6.44	7.91							
04-20-95	252	900	24.5	6.37	7.77	34.0	68.4	275	0.00	0.00	a	a

04-21-95	253	900	24.7	6.43	7.55							
04-22-95	254	1200	25.2	6.42	7.48							
04-23-95	255	2000	25.9	6.40	7.66							
04-24-95	256	900	24.2	6.49	7.47							
04-25-95	257	900	24.2	6.40	7.30							
04-26-95	258	900	24.0	6.46	7.32							
04-27-95	259	900	24.8	6.44	7.14	34.0	85.5	276	0.00	0.00	a	a
04-28-95	260	900	24.9	6.41	7.26							
04-29-95	261	1100	24.9	6.42	7.04							
04-30-95	262	1600	24.3	6.41	7.78							
05-01-95	263	900	24.8	6.45	8.02							
05-02-95	264	900	24.7	6.45	8.41							
05-03-95	265	900	24.5	6.46	7.53							
05-04-95	266	900	24.5	6.48	7.76	40.8	85.5	284	0.00	0.00	a	a
05-05-95	267	900	24.7	6.46	7.72							
05-06-95	268	830	24.8	6.46	7.33							
05-07-95	269	900	24.8	6.53	7.32							
05-08-95	270	900	24.4	6.44	7.86							
05-09-95	271	900	24.3	6.52	7.68							
05-10-95	272	900	24.9	6.33	7.63							
MEAN			23.5		7.12	39.4	135.9				0.079	0.00010
MINIMUM			18.6	5.84	2.75	27.2	68.4	267	0.00	0.00	0.013	0.00002
MAXIMUM			31.2	6.99	9.29	54.4	444.6	>1999	0.00	0.00	0.489	0.00088
Std Dev			1.65		1.035	7.98	89.45				0.0869	0.000158
N			272	271	272	38	38	38	38	38	28	28

[a] Data not available; analytical instrument would not calibrate.

TANK No. 15
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.4	6.47	6.85							
08-13-94	2	900	25.0	6.46	6.04							
08-14-94	3	900	24.9	6.51	5.89							
08-15-94	4	900	24.1	6.49	5.92							
08-16-94	5	1000	24.0	6.56	6.20							
08-17-94	6	1000	25.1	6.73	5.85							
08-18-94	7	900	25.0	6.57	5.69	34.0	85.5	798	0.00	0.00	0.314	0.00066
08-19-94	8	800	24.2	6.35	5.60							
08-20-94	9	1000	24.8	6.22	6.04							
08-21-94	10	800	25.1	6.11	5.89							
08-22-94	11	900	24.2	6.23	5.75							
08-23-94	12	730	23.1	6.35	6.38							
08-24-94	13	1000	23.9	5.83	6.47							
08-25-94	14	1100	23.8	6.13	6.49	40.8	102.6	663	0.00	0.00	0.069	0.00005
08-26-94	15	900	24.2	6.23	6.15							
08-27-94	16	900	24.0	6.37	5.98							
08-28-94	17	800	24.4	6.44	6.04							
08-29-94	18	900	25.0	6.48	5.66							
08-30-94	19	900	23.0	6.40	5.94							
08-31-94	20	800	24.1	6.57	6.51							
09-01-94	21	1100	24.4	6.41	6.51	47.6	102.6	533	0.00	0.00	a	a
09-02-94	22	900	23.7	6.42	6.10							
09-03-94	23	815	24.3	6.30	6.13							
09-04-94	24	810	24.2	6.54	6.29							
09-05-94	25	1100	24.6	6.07	6.48							
09-06-94	26	900	24.6	6.15	6.62							
09-07-94	27	800	24.3	6.24	6.91							
09-08-94	28	1100	23.8	6.46	6.56	54.4	119.7	571	0.00	0.00	0.008	0.00001
09-09-94	29	900	23.8	6.44	7.05							
09-10-94	30	900	24.3	6.46	6.48							
09-11-94	31	800	23.2	6.47	6.31							
09-12-94	32	500	24.0	6.63	6.54							

09-13-94	33	700	24.2	6.51	6.85							
09-14-94	34	1400	26.7	6.49	5.60							
09-15-94	35	1300	25.9	6.79	6.98							
09-16-94	36	1200	25.3	6.20	5.69	27.2	119.7	755	0.00	0.00	0.059	0.00005
09-17-94	37	820	25.2	6.12	5.83							
09-18-94	38	830	25.2	6.42	5.53							
09-19-94	39	1000	24.4	6.59	5.91							
09-20-94	40	1000	24.0	6.45	5.92							
09-21-94	41	1000	25.3	6.50	6.05							
09-22-94	42	900	24.2	6.47	6.09	54.4	119.7	650	0.00	0.00	a	a
09-23-94	43	1000	24.0	6.23	6.77							
09-24-94	44	845	24.0	6.28	6.14							
09-25-94	45	1300	24.9	a	6.28							
09-26-94	46	900	26.1	6.33	5.08							
09-27-94	47	800	24.9	6.07	6.14							
09-28-94	48	1000	24.3	6.12	5.61	34.0	102.6	814	a	a	a	a
09-29-94	49	1030	26.2	6.47	3.88							
09-30-94	50	1030	22.9	6.38	6.93							
10-01-94	51	900	23.6	6.53	6.44							
10-02-94	52	915	23.3	6.41	6.25							
10-03-94	53	1100	22.5	6.31	6.53							
10-04-94	54	1100	23.3	6.35	6.59							
10-05-94	55	1000	24.2	6.43	6.64							
10-06-94	56	800	23.0	6.46	6.82	54.4	119.7	714	0.00	0.00	a	a
10-07-94	57	1100	23.9	6.38	7.35						0.043	0.00005
10-08-94	58	1100	24.5	6.39	7.31							
10-09-94	59	1100	26.6	6.34	6.08							
10-10-94	60	1000	24.5	6.40	6.06							
10-11-94	61	1600	25.0	6.88	6.16							
10-12-94	62	900	22.0	6.47	7.74							
10-13-94	63	1300	24.0	6.33	7.00	40.8	239.4	1758	0.00	0.00	a	a
10-14-94	64	1300	24.4	6.32	6.23							
10-15-94	65	900	24.3	6.44	6.60							
10-16-94	66	900	23.7	5.96	7.28							
10-17-94	67	1000	23.4	6.33	7.34							
10-18-94	68	800	23.8	6.06	6.86							
10-19-94	69	900	24.3	5.99	7.28							
10-20-94	70	900	23.7	6.08	6.45	27.2	393.3	>1999	0.00	0.00	0.056	0.00003
10-21-94	71	900	21.7	6.25	7.42							
10-22-94	72	800	22.5	6.31	6.95							
10-23-94	73	900	22.9	6.15	7.46							
10-24-94	74	900	21.2	6.27	7.01							
10-25-94	75	900	22.6	6.20	6.63							
10-26-94	76	800	21.3	6.30	6.77							

10-27-94	77	1100	21.2	6.33	7.20	40.8	119.7	755	0.00	0.00	0.079	0.00007
10-28-94	78	1000	20.8	6.40	7.43							
10-29-94	79	900	21.0	6.33	7.37							
10-30-94	80	900	21.5	6.34	7.47							
10-31-94	81	1000	22.3	6.36	7.10							
11-01-94	82	1100	25.1	6.34	5.92							
11-02-94	83	1000	22.1	6.29	7.00							
11-03-94	84	1000	21.4	6.36	6.53							
11-04-94	85	1000	22.1	6.41	6.49	54.4	153.9	848	0.00	0.00	0.190	0.00023
11-05-94	86	1000	22.6	6.37	7.48							
11-06-94	87	1000	24.2	6.32	6.79							
11-07-94	88	700	22.0	6.36	7.22							
11-08-94	89	1000	21.0	6.41	7.90							
11-09-94	90	1000	22.2	6.38	7.29							
11-10-94	91	1100	22.3	6.38	6.74							
11-11-94	92	900	19.8	6.30	7.29	40.8	153.9	857	0.00	0.00	0.094	0.00007
11-12-94	93	845	19.0	6.28	7.37							
11-13-94	94	830	21.1	6.34	7.45							
11-14-94	95	1000	21.8	6.28	6.98							
11-15-94	96	900	22.3	6.20	6.95							
11-16-94	97	900	22.1	6.30	6.47	40.8	119.7	990	0.00	0.00	0.065	0.00006
11-17-94	98	900	21.7	6.34	6.97							
11-18-94	99	900	24.6	6.00	6.80							
11-19-94	100	800	23.2	6.15	6.47							
11-20-94	101	900	23.1	6.32	6.73							
11-21-94	102	600	22.6	6.31	6.93							
11-22-94	103	600	24.0	6.20	6.73							
11-23-94	104	800	19.7	6.29	7.85	40.8	119.7	1781	0.00	0.00	0.087	0.00007
11-24-94	105	730	22.7	6.28	7.92							
11-25-94	106	1020	22.9	6.26	8.70							
11-26-94	107	1000	20.4	6.31	9.23							
11-27-94	108	900	20.5	6.23	8.18							
11-28-94	109	900	22.1	6.06	8.19							
11-29-94	110	900	21.6	6.16	7.76							
11-30-94	111	900	21.8	6.19	7.69							
12-01-94	112	900	21.4	6.15	7.90	34.0	85.5	417	0.00	0.00	0.110	0.00007
12-02-94	113	1000	22.2	6.28	8.34							
12-03-94	114	1000	21.8	6.25	7.64							
12-04-94	115	1100	23.3	6.29	7.21							
12-05-94	116	900	24.9	6.20	6.68							
12-06-94	117	900	23.6	6.26	6.88							
12-07-94	118	800	23.4	6.27	7.54							
12-08-94	119	1100	26.3	6.40	6.01	40.8	102.6	459	0.00	0.00	0.082	0.00013
12-09-94	120	1000	23.2	6.41	7.12							

12-10-94	121	1300	23.1	6.35	7.42							
12-11-94	122	900	31.3	6.40	3.47							
12-12-94	123	900	24.5	6.82	7.72							
12-13-94	124	900	24.3	6.92	7.95							
12-14-94	125	900	24.2	6.89	8.00							
12-15-94	126	800	21.8	6.34	8.83	34.0	342.0	>1999	0.00	0.00	0.093	0.00009
12-16-94	127	1100	23.0	6.26	7.91							
12-17-94	128	845	23.1	6.26	7.81							
12-18-94	129	930	23.0	6.26	7.23							
12-19-94	130	1000	23.5	6.27	7.33							
12-20-94	131	1100	23.2	6.40	7.77							
12-21-94	132	1000	20.1	6.30	8.68	40.8	239.4	1592	0.00	0.00	0.100	0.00008
12-22-94	133	800	27.8	6.65	6.24							
12-23-94	134	1000	27.9	6.48	5.48							
12-24-94	135	900	28.1	6.68	6.54							
12-25-94	136	700	25.2	6.96	7.56							
12-26-94	137	1000	25.5	6.92	7.35							
12-27-94	138	1100	21.8	6.32	7.97							
12-28-94	139	1000	22.0	6.30	8.63							
12-29-94	140	900	21.1	6.29	7.81	40.8	188.1	974	0.00	0.00	0.097	0.00008
12-30-94	141	1000	28.1	6.43	6.39							
12-31-94	142	1000	28.2	6.73	3.48							
01-01-95	143	1100	22.1	6.38	7.89							
01-02-95	144	1000	21.8	6.35	7.70							
01-03-95	145	1100	23.0	6.37	7.22							
01-04-95	146	900	20.3	6.38	8.56							
01-05-95	147	1100	26.1	6.79	5.05	54.4	102.6	505	0.00	0.00	0.057	0.00022
01-06-95	148	1000	23.4	6.86	7.85							
01-07-95	149	1130	24.5	6.70	8.16							
01-08-95	150	1030	24.1	6.92	8.19							
01-09-95	151	1000	24.0	6.88	8.50							
01-10-95	152	1000	20.5	6.20	8.75							
01-11-95	153	1000	21.0	6.30	7.97							
01-12-95	154	1100	21.7	6.16	7.48	34.0	119.7	430	0.00	0.00	0.044	0.00003
01-13-95	155	1000	22.2	6.06	7.46							
01-14-95	156	900	23.1	6.30	6.83							
01-15-95	157	800	25.6	6.51	6.18							
01-16-95	158	1030	24.4	6.35	6.44							
01-17-95	159	1000	24.0	6.40	7.36							
01-18-95	160	1000	24.3	6.73	6.52							
01-19-95	161	1000	23.8	6.67	7.49	54.4	444.6	>1999	0.00	0.00	a	a
01-20-95	162	1000	24.1	6.15	7.24							
01-21-95	163	1000	24.8	6.21	6.28							
01-22-95	164	1100	23.8	6.48	6.92							

01-23-95	165	600	22.0	6.31	8.03							
01-24-95	166	1000	23.0	6.30	8.25							
01-25-95	167	1100	25.3	6.36	5.46							
01-26-95	168	1000	22.0	6.30	7.10	34.0	85.5	369	0.00	0.00	0.041	0.00004
01-27-95	169	1000	21.1	6.20	7.83							
01-28-95	170	830	21.7	6.31	7.36							
01-29-95	171	900	24.2	6.30	7.20							
01-30-95	172	1000	21.8	6.43	7.86							
01-31-95	173	1000	21.2	6.92	7.86							
02-01-95	174	1000	20.3	6.46	8.38							
02-02-95	175	900	21.7	6.40	7.68	40.8	136.8	618	0.00	0.00	0.091	0.00010
02-03-95	176	930	26.2	6.52	3.07							
02-04-95	177	1000	20.0	6.54	9.11							
02-05-95	178	1200	25.0	6.64	4.60							
02-06-95	179	930	22.4	6.87	7.82							
02-07-95	180	900	22.9	6.86	7.81							
02-08-95	181	900	22.7	6.68	8.06							
02-09-95	182	900	22.0	6.56	8.48	40.8	85.5	295	0.00	0.00	0.013	0.00002
02-10-95	183	900	22.2	6.53	8.20							
02-11-95	184	900	21.8	6.36	8.67							
02-12-95	185	1200	21.8	6.18	8.83							
02-13-95	186	900	21.7	6.46	8.72							
02-14-95	187	900	21.6	6.34	8.58							
02-15-95	188	900	21.7	6.23	8.65							
02-16-95	189	900	21.7	6.20	8.77	34.0	85.5	293	0.00	0.00	0.028	0.00002
02-17-95	190	900	23.2	6.28	8.35							
02-18-95	191	1100	23.7	6.22	8.65							
02-19-95	192	1400	24.0	6.17	8.55							
02-20-95	193	1000	23.7	6.30	8.24							
02-21-95	194	1000	23.6	6.25	8.24							
02-22-95	195	900	23.7	6.34	8.10							
02-23-95	196	1000	24.7	6.33	8.12	27.2	85.5	299	0.00	0.00	0.053	0.00006
02-24-95	197	1000	24.2	6.33	7.82							
02-25-95	198	1000	24.2	6.34	8.02							
02-26-95	199	1800	24.4	6.41	8.16							
02-27-95	200	900	24.4	6.28	7.90							
02-28-95	201	900	24.7	6.38	7.87							
03-01-95	202	900	24.7	6.39	7.91							
03-02-95	203	900	24.6	6.39	7.93	27.2	85.5	374	0.00	0.00	0.013	0.00002
03-03-95	204	900	24.4	6.35	7.65							
03-04-95	205	1000	23.4	6.37	7.76							
03-05-95	206	1015	23.2	6.38	7.82							
03-06-95	207	900	23.5	6.34	7.64							
03-07-95	208	900	23.6	6.28	7.55							

03-08-95	209	900	23.4	6.37	7.67							
03-09-95	210	1000	23.6	6.35	7.63	34.0	85.5	297	0.00	0.00	0.015	0.00002
03-10-95	211	900	25.0	6.32	7.39							
03-11-95	212	1100	24.3	6.30	7.62							
03-12-95	213	1800	25.3	6.30	7.46							
03-13-95	214	900	24.6	6.30	7.38							
03-14-95	215	900	24.7	6.30	7.85							
03-15-95	216	900	23.9	6.28	7.82							
03-16-95	217	900	25.0	6.29	7.82	34.0	85.5	271	0.00	0.00	0.011	0.00001
03-17-95	218	900	25.2	6.30	7.73							
03-18-95	219	1000	25.2	6.32	7.51							
03-19-95	220	1600	25.9	6.34	7.49							
03-20-95	221	900	24.8	6.31	7.55							
03-21-95	222	900	25.1	6.28	7.53							
03-22-95	223	900	25.0	6.27	7.61							
03-23-95	224	1100	24.9	6.31	7.49	40.8	85.5	294	0.00	0.00	a	a
03-24-95	225	900	25.0	6.31	6.66							
03-25-95	226	915	24.9	6.36	7.08							
03-26-95	227	900	24.8	6.37	7.81							
03-27-95	228	900	25.0	6.29	7.16							
03-28-95	229	900	24.7	6.29	6.97							
03-29-95	230	900	24.6	6.30	6.97							
03-30-95	231	900	24.7	6.33	6.80	40.8	85.5	275	0.00	0.00	0.067	0.00007
03-31-95	232	900	24.6	6.35	6.80							
04-01-95	233	900	24.7	6.39	7.02							
04-02-95	234	1000	24.3	6.41	7.34							
04-03-95	235	900	24.2	6.34	7.26							
04-04-95	236	900	24.7	6.39	7.00							
04-05-95	237	900	23.7	6.31	7.12							
04-06-95	238	900	24.5	6.38	7.12	34.0	85.5	289	0.00	0.00	0.054	0.00005
04-07-95	239	900	24.8	6.39	6.96							
04-08-95	240	1100	24.9	6.37	7.11							
04-09-95	241	1300	25.4	6.36	7.44							
04-10-95	242	900	25.0	6.32	6.74							
04-11-95	243	900	25.2	6.39	7.23							
04-12-95	244	900	25.5	6.39	7.06							
04-13-95	245	1100	25.2	6.41	7.16	34.0	85.5	305	0.00	0.00	0.041	0.00005
04-14-95	246	900	25.0	6.37	6.77							
04-15-95	247	1400	25.3	6.42	7.57							
04-16-95	248	1100	24.6	6.34	7.36							
04-17-95	249	900	24.6	6.41	7.33							
04-18-95	250	900	24.4	6.39	7.67							
04-19-95	251	900	24.7	6.44	7.75							
04-20-95	252	900	24.8	6.37	7.48	34.0	68.4	277	0.00	0.00	a	a

04-21-95	253	900	25.2	6.43	7.31							
04-22-95	254	1200	25.2	6.42	7.28							
04-23-95	255	2000	25.1	6.40	7.47							
04-24-95	256	900	24.5	6.49	7.28							
04-25-95	257	900	24.5	6.40	7.11							
04-26-95	258	900	24.2	6.46	7.13							
04-27-95	259	900	25.1	6.44	7.30	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.0	6.41	7.17							
04-29-95	261	1100	25.1	6.42	6.80							
04-30-95	262	1600	24.7	6.41	7.59							
05-01-95	263	900	25.1	6.45	7.73							
05-02-95	264	900	24.9	6.45	8.27							
05-03-95	265	900	24.8	6.46	7.26							
05-04-95	266	900	24.8	6.48	7.49	34.0	85.5	286	0.00	0.00	a	a
05-05-95	267	900	25.0	6.46	7.43							
05-06-95	268	830	24.9	6.47	7.30							
05-07-95	269	900	24.9	6.50	7.44							
05-08-95	270	900	25.0	6.44	7.27							
05-09-95	271	900	24.9	6.52	7.27							
05-10-95	272	900	25.3	6.33	7.49							
MEAN			23.8		7.12	39.2	134.6				0.072	0.00009
MINIMUM			19.0	5.83	3.07	27.2	68.4	271	0.00	0.00	0.008	0.00001
MAXIMUM			31.3	6.96	9.23	54.4	444.6	>1999	0.00	0.00	0.314	0.00066
Std Dev			1.63		0.929	8.02	85.70				0.0593	0.000120
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 15
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.4	6.47	6.85							
08-13-94	2	900	25.0	6.46	6.04							
08-14-94	3	900	24.9	6.51	5.89							
08-15-94	4	900	24.1	6.49	5.92							
08-16-94	5	1000	24.0	6.56	6.20							
08-17-94	6	1000	25.1	6.73	5.85							
08-18-94	7	900	25.0	6.57	5.69	34.0	85.5	798	0.00	0.00	0.314	0.00066
08-19-94	8	800	24.2	6.35	5.60							
08-20-94	9	1000	24.8	6.22	6.04							
08-21-94	10	800	25.1	6.11	5.89							
08-22-94	11	900	24.2	6.23	5.75							
08-23-94	12	730	23.1	6.35	6.38							
08-24-94	13	1000	23.9	5.83	6.47							
08-25-94	14	1100	23.8	6.13	6.49	40.8	102.6	663	0.00	0.00	0.069	0.00005
08-26-94	15	900	24.2	6.23	6.15							
08-27-94	16	900	24.0	6.37	5.98							
08-28-94	17	800	24.4	6.44	6.04							
08-29-94	18	900	25.0	6.48	5.66							
08-30-94	19	900	23.0	6.40	5.94							
08-31-94	20	800	24.1	6.57	6.51							
09-01-94	21	1100	24.4	6.41	6.51	47.6	102.6	533	0.00	0.00	a	a
09-02-94	22	900	23.7	6.42	6.10							
09-03-94	23	815	24.3	6.30	6.13							
09-04-94	24	810	24.2	6.54	6.29							
09-05-94	25	1100	24.6	6.07	6.48							
09-06-94	26	900	24.6	6.15	6.62							
09-07-94	27	800	24.3	6.24	6.91							
09-08-94	28	1100	23.8	6.46	6.56	54.4	119.7	571	0.00	0.00	0.008	0.00001
09-09-94	29	900	23.8	6.44	7.05							
09-10-94	30	900	24.3	6.46	6.48							
09-11-94	31	800	23.2	6.47	6.31							
09-12-94	32	500	24.0	6.63	6.54							

09-13-94	33	700	24.2	6.51	6.85							
09-14-94	34	1400	26.7	6.49	5.60							
09-15-94	35	1300	25.9	6.79	6.98							
09-16-94	36	1200	25.3	6.20	5.69	27.2	119.7	755	0.00	0.00	0.059	0.00005
09-17-94	37	820	25.2	6.12	5.83							
09-18-94	38	830	25.2	6.42	5.53							
09-19-94	39	1000	24.4	6.59	5.91							
09-20-94	40	1000	24.0	6.45	5.92							
09-21-94	41	1000	25.3	6.50	6.05							
09-22-94	42	900	24.2	6.47	6.09	54.4	119.7	650	0.00	0.00	a	a
09-23-94	43	1000	24.0	6.23	6.77							
09-24-94	44	845	24.0	6.28	6.14							
09-25-94	45	1300	24.9	a	6.28							
09-26-94	46	900	26.1	6.33	5.08							
09-27-94	47	800	24.9	6.07	6.14							
09-28-94	48	1000	24.3	6.12	5.61	34.0	102.6	814	a	a	a	a
09-29-94	49	1030	26.2	6.47	3.88							
09-30-94	50	1030	22.9	6.38	6.93							
10-01-94	51	900	23.6	6.53	6.44							
10-02-94	52	915	23.3	6.41	6.25							
10-03-94	53	1100	22.5	6.31	6.53							
10-04-94	54	1100	23.3	6.35	6.59							
10-05-94	55	1000	24.2	6.43	6.64							
10-06-94	56	800	23.0	6.46	6.82	54.4	119.7	714	0.00	0.00	a	a
10-07-94	57	1100	23.9	6.38	7.35						0.043	0.00005
10-08-94	58	1100	24.5	6.39	7.31							
10-09-94	59	1100	26.6	6.34	6.08							
10-10-94	60	1000	24.5	6.40	6.06							
10-11-94	61	1600	25.0	6.88	6.16							
10-12-94	62	900	22.0	6.47	7.74							
10-13-94	63	1300	24.0	6.33	7.00	40.8	239.4	1758	0.00	0.00	a	a
10-14-94	64	1300	24.4	6.32	6.23							
10-15-94	65	900	24.3	6.44	6.60							
10-16-94	66	900	23.7	5.96	7.28							
10-17-94	67	1000	23.4	6.33	7.34							
10-18-94	68	800	23.8	6.06	6.86							
10-19-94	69	900	24.3	5.99	7.28							
10-20-94	70	900	23.7	6.08	6.45	27.2	393.3	>1999	0.00	0.00	0.056	0.00003
10-21-94	71	900	21.7	6.25	7.42							
10-22-94	72	800	22.5	6.31	6.95							
10-23-94	73	900	22.9	6.15	7.46							
10-24-94	74	900	21.2	6.27	7.01							
10-25-94	75	900	22.6	6.20	6.63							
10-26-94	76	800	21.3	6.30	6.77							

10-27-94	77	1100	21.2	6.33	7.20	40.8	119.7	755	0.00	0.00	0.079	0.00007
10-28-94	78	1000	20.8	6.40	7.43							
10-29-94	79	900	21.0	6.33	7.37							
10-30-94	80	900	21.5	6.34	7.47							
10-31-94	81	1000	22.3	6.36	7.10							
11-01-94	82	1100	25.1	6.34	5.92							
11-02-94	83	1000	22.1	6.29	7.00							
11-03-94	84	1000	21.4	6.36	6.53							
11-04-94	85	1000	22.1	6.41	6.49	54.4	153.9	848	0.00	0.00	0.190	0.00023
11-05-94	86	1000	22.6	6.37	7.48							
11-06-94	87	1000	24.2	6.32	6.79							
11-07-94	88	700	22.0	6.36	7.22							
11-08-94	89	1000	21.0	6.41	7.90							
11-09-94	90	1000	22.2	6.38	7.29							
11-10-94	91	1100	22.3	6.38	6.74							
11-11-94	92	900	19.8	6.30	7.29	40.8	153.9	857	0.00	0.00	0.094	0.00007
11-12-94	93	845	19.0	6.28	7.37							
11-13-94	94	830	21.1	6.34	7.45							
11-14-94	95	1000	21.8	6.28	6.98							
11-15-94	96	900	22.3	6.20	6.95							
11-16-94	97	900	22.1	6.30	6.47	40.8	119.7	990	0.00	0.00	0.065	0.00006
11-17-94	98	900	21.7	6.34	6.97							
11-18-94	99	900	24.6	6.00	6.80							
11-19-94	100	800	23.2	6.15	6.47							
11-20-94	101	900	23.1	6.32	6.73							
11-21-94	102	600	22.6	6.31	6.93							
11-22-94	103	600	24.0	6.20	6.73							
11-23-94	104	800	19.7	6.29	7.85	40.8	119.7	1781	0.00	0.00	0.087	0.00007
11-24-94	105	730	22.7	6.28	7.92							
11-25-94	106	1020	22.9	6.26	8.70							
11-26-94	107	1000	20.4	6.31	9.23							
11-27-94	108	900	20.5	6.23	8.18							
11-28-94	109	900	22.1	6.06	8.19							
11-29-94	110	900	21.6	6.16	7.76							
11-30-94	111	900	21.8	6.19	7.69							
12-01-94	112	900	21.4	6.15	7.90	34.0	85.5	417	0.00	0.00	0.110	0.00007
12-02-94	113	1000	22.2	6.28	8.34							
12-03-94	114	1000	21.8	6.25	7.64							
12-04-94	115	1100	23.3	6.29	7.21							
12-05-94	116	900	24.9	6.20	6.68							
12-06-94	117	900	23.6	6.26	6.88							
12-07-94	118	800	23.4	6.27	7.54							
12-08-94	119	1100	26.3	6.40	6.01	40.8	102.6	459	0.00	0.00	0.082	0.00013
12-09-94	120	1000	23.2	6.41	7.12							

12-10-94	121	1300	23.1	6.35	7.42							
12-11-94	122	900	31.3	6.40	3.47							
12-12-94	123	900	24.5	6.82	7.72							
12-13-94	124	900	24.3	6.92	7.95							
12-14-94	125	900	24.2	6.89	8.00							
12-15-94	126	800	21.8	6.34	8.83	34.0	342.0	>1999	0.00	0.00	0.093	0.00009
12-16-94	127	1100	23.0	6.26	7.91							
12-17-94	128	845	23.1	6.26	7.81							
12-18-94	129	930	23.0	6.26	7.23							
12-19-94	130	1000	23.5	6.27	7.33							
12-20-94	131	1100	23.2	6.40	7.77							
12-21-94	132	1000	20.1	6.30	8.68	40.8	239.4	1592	0.00	0.00	0.100	0.00008
12-22-94	133	800	27.8	6.65	6.24							
12-23-94	134	1000	27.9	6.48	5.48							
12-24-94	135	900	28.1	6.68	6.54							
12-25-94	136	700	25.2	6.96	7.56							
12-26-94	137	1000	25.5	6.92	7.35							
12-27-94	138	1100	21.8	6.32	7.97							
12-28-94	139	1000	22.0	6.30	8.63							
12-29-94	140	900	21.1	6.29	7.81	40.8	188.1	974	0.00	0.00	0.097	0.00008
12-30-94	141	1000	28.1	6.43	6.39							
12-31-94	142	1000	28.2	6.73	3.48							
01-01-95	143	1100	22.1	6.38	7.89							
01-02-95	144	1000	21.8	6.35	7.70							
01-03-95	145	1100	23.0	6.37	7.22							
01-04-95	146	900	20.3	6.38	8.56							
01-05-95	147	1100	26.1	6.79	5.05	54.4	102.6	505	0.00	0.00	0.057	0.00022
01-06-95	148	1000	23.4	6.86	7.85							
01-07-95	149	1130	24.5	6.70	8.16							
01-08-95	150	1030	24.1	6.92	8.19							
01-09-95	151	1000	24.0	6.88	8.50							
01-10-95	152	1000	20.5	6.20	8.75							
01-11-95	153	1000	21.0	6.30	7.97							
01-12-95	154	1100	21.7	6.16	7.48	34.0	119.7	430	0.00	0.00	0.044	0.00003
01-13-95	155	1000	22.2	6.06	7.46							
01-14-95	156	900	23.1	6.30	6.83							
01-15-95	157	800	25.6	6.51	6.18							
01-16-95	158	1030	24.4	6.35	6.44							
01-17-95	159	1000	24.0	6.40	7.36							
01-18-95	160	1000	24.3	6.73	6.52							
01-19-95	161	1000	23.8	6.67	7.49	54.4	444.6	>1999	0.00	0.00	a	a
01-20-95	162	1000	24.1	6.15	7.24							
01-21-95	163	1000	24.8	6.21	6.28							
01-22-95	164	1100	23.8	6.48	6.92							

01-23-95	165	600	22.0	6.31	8.03							
01-24-95	166	1000	23.0	6.30	8.25							
01-25-95	167	1100	25.3	6.36	5.46							
01-26-95	168	1000	22.0	6.30	7.10	34.0	85.5	369	0.00	0.00	0.041	0.00004
01-27-95	169	1000	21.1	6.20	7.83							
01-28-95	170	830	21.7	6.31	7.36							
01-29-95	171	900	24.2	6.30	7.20							
01-30-95	172	1000	21.8	6.43	7.86							
01-31-95	173	1000	21.2	6.92	7.86							
02-01-95	174	1000	20.3	6.46	8.38							
02-02-95	175	900	21.7	6.40	7.68	40.8	136.8	618	0.00	0.00	0.091	0.00010
02-03-95	176	930	26.2	6.52	3.07							
02-04-95	177	1000	20.0	6.54	9.11							
02-05-95	178	1200	25.0	6.64	4.60							
02-06-95	179	930	22.4	6.87	7.82							
02-07-95	180	900	22.9	6.86	7.81							
02-08-95	181	900	22.7	6.68	8.06							
02-09-95	182	900	22.0	6.56	8.48	40.8	85.5	295	0.00	0.00	0.013	0.00002
02-10-95	183	900	22.2	6.53	8.20							
02-11-95	184	900	21.8	6.36	8.67							
02-12-95	185	1200	21.8	6.18	8.83							
02-13-95	186	900	21.7	6.46	8.72							
02-14-95	187	900	21.6	6.34	8.58							
02-15-95	188	900	21.7	6.23	8.65							
02-16-95	189	900	21.7	6.20	8.77	34.0	85.5	293	0.00	0.00	0.028	0.00002
02-17-95	190	900	23.2	6.28	8.35							
02-18-95	191	1100	23.7	6.22	8.65							
02-19-95	192	1400	24.0	6.17	8.55							
02-20-95	193	1000	23.7	6.30	8.24							
02-21-95	194	1000	23.6	6.25	8.24							
02-22-95	195	900	23.7	6.34	8.10							
02-23-95	196	1000	24.7	6.33	8.12	27.2	85.5	299	0.00	0.00	0.053	0.00006
02-24-95	197	1000	24.2	6.33	7.82							
02-25-95	198	1000	24.2	6.34	8.02							
02-26-95	199	1800	24.4	6.41	8.16							
02-27-95	200	900	24.4	6.28	7.90							
02-28-95	201	900	24.7	6.38	7.87							
03-01-95	202	900	24.7	6.39	7.91							
03-02-95	203	900	24.6	6.39	7.93	27.2	85.5	374	0.00	0.00	0.013	0.00002
03-03-95	204	900	24.4	6.35	7.65							
03-04-95	205	1000	23.4	6.37	7.76							
03-05-95	206	1015	23.2	6.38	7.82							
03-06-95	207	900	23.5	6.34	7.64							
03-07-95	208	900	23.6	6.28	7.55							

03-08-95	209	900	23.4	6.37	7.67							
03-09-95	210	1000	23.6	6.35	7.63	34.0	85.5	297	0.00	0.00	0.015	0.00002
03-10-95	211	900	25.0	6.32	7.39							
03-11-95	212	1100	24.3	6.30	7.62							
03-12-95	213	1800	25.3	6.30	7.46							
03-13-95	214	900	24.6	6.30	7.38							
03-14-95	215	900	24.7	6.30	7.85							
03-15-95	216	900	23.9	6.28	7.82							
03-16-95	217	900	25.0	6.29	7.82	34.0	85.5	271	0.00	0.00	0.011	0.00001
03-17-95	218	900	25.2	6.30	7.73							
03-18-95	219	1000	25.2	6.32	7.51							
03-19-95	220	1600	25.9	6.34	7.49							
03-20-95	221	900	24.8	6.31	7.55							
03-21-95	222	900	25.1	6.28	7.53							
03-22-95	223	900	25.0	6.27	7.61							
03-23-95	224	1100	24.9	6.31	7.49	40.8	85.5	294	0.00	0.00	a	a
03-24-95	225	900	25.0	6.31	6.66							
03-25-95	226	915	24.9	6.36	7.08							
03-26-95	227	900	24.8	6.37	7.81							
03-27-95	228	900	25.0	6.29	7.16							
03-28-95	229	900	24.7	6.29	6.97							
03-29-95	230	900	24.6	6.30	6.97							
03-30-95	231	900	24.7	6.33	6.80	40.8	85.5	275	0.00	0.00	0.067	0.00007
03-31-95	232	900	24.6	6.35	6.80							
04-01-95	233	900	24.7	6.39	7.02							
04-02-95	234	1000	24.3	6.41	7.34							
04-03-95	235	900	24.2	6.34	7.26							
04-04-95	236	900	24.7	6.39	7.00							
04-05-95	237	900	23.7	6.31	7.12							
04-06-95	238	900	24.5	6.38	7.12	34.0	85.5	289	0.00	0.00	0.054	0.00005
04-07-95	239	900	24.8	6.39	6.96							
04-08-95	240	1100	24.9	6.37	7.11							
04-09-95	241	1300	25.4	6.36	7.44							
04-10-95	242	900	25.0	6.32	6.74							
04-11-95	243	900	25.2	6.39	7.23							
04-12-95	244	900	25.5	6.39	7.06							
04-13-95	245	1100	25.2	6.41	7.16	34.0	85.5	305	0.00	0.00	0.041	0.00005
04-14-95	246	900	25.0	6.37	6.77							
04-15-95	247	1400	25.3	6.42	7.57							
04-16-95	248	1100	24.6	6.34	7.36							
04-17-95	249	900	24.6	6.41	7.33							
04-18-95	250	900	24.4	6.39	7.67							
04-19-95	251	900	24.7	6.44	7.75							
04-20-95	252	900	24.8	6.37	7.48	34.0	68.4	277	0.00	0.00	a	a

04-21-95	253	900	25.2	6.43	7.31							
04-22-95	254	1200	25.2	6.42	7.28							
04-23-95	255	2000	25.1	6.40	7.47							
04-24-95	256	900	24.5	6.49	7.28							
04-25-95	257	900	24.5	6.40	7.11							
04-26-95	258	900	24.2	6.46	7.13							
04-27-95	259	900	25.1	6.44	7.30	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.0	6.41	7.17							
04-29-95	261	1100	25.1	6.42	6.80							
04-30-95	262	1600	24.7	6.41	7.59							
05-01-95	263	900	25.1	6.45	7.73							
05-02-95	264	900	24.9	6.45	8.27							
05-03-95	265	900	24.8	6.46	7.26							
05-04-95	266	900	24.8	6.48	7.49	34.0	85.5	286	0.00	0.00	a	a
05-05-95	267	900	25.0	6.46	7.43							
05-06-95	268	830	24.9	6.47	7.30							
05-07-95	269	900	24.9	6.50	7.44							
05-08-95	270	900	25.0	6.44	7.27							
05-09-95	271	900	24.9	6.52	7.27							
05-10-95	272	900	25.3	6.33	7.49							
MEAN			23.8		7.12	39.2	134.6				0.072	0.00009
MINIMUM			19.0	5.83	3.07	27.2	68.4	271	0.00	0.00	0.008	0.00001
MAXIMUM			31.3	6.96	9.23	54.4	444.6	>1999	0.00	0.00	0.314	0.00066
Std Dev			1.63		0.929	8.02	85.70				0.0593	0.000120
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 16
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH WEST BRANCH OF CANAL CREEK WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	1000	24.4	6.47	6.85							
08-13-94	2	900	24.9	6.46	5.92							
08-14-94	3	900	24.9	6.52	5.80							
08-15-94	4	900	24.0	6.49	5.97							
08-16-94	5	1000	23.9	6.56	6.13							
08-17-94	6	1000	25.1	6.71	5.88							
08-18-94	7	900	24.9	6.50	5.80	34.0	85.5	807	0.00	0.00	0.314	0.00056
08-19-94	8	800	24.2	6.35	5.62							
08-20-94	9	1000	24.8	6.22	6.06							
08-21-94	10	800	25.1	6.11	5.92							
08-22-94	11	900	24.1	6.23	5.69							
08-23-94	12	730	23.0	6.35	6.35							
08-24-94	13	1000	23.8	5.80	6.44							
08-25-94	14	1100	23.7	6.13	6.48	40.8	119.7	680	0.00	0.00	0.083	0.00006
08-26-94	15	900	24.0	6.23	6.01							
08-27-94	16	900	23.8	6.35	5.79							
08-28-94	17	800	24.2	6.44	5.77							
08-29-94	18	900	24.9	6.48	5.47							
08-30-94	19	900	22.7	6.40	5.68							
08-31-94	20	800	23.9	6.57	6.31							
09-01-94	21	1100	24.2	6.40	6.29	47.6	119.7	506	0.00	0.00	a	a
09-02-94	22	900	23.5	6.39	5.83							
09-03-94	23	815	24.3	6.22	6.08							
09-04-94	24	810	24.1	6.51	6.26							
09-05-94	25	1100	24.3	5.97	6.52							
09-06-94	26	900	24.4	6.10	6.57							
09-07-94	27	800	23.9	6.22	6.82							
09-08-94	28	1100	24.1	6.46	6.67	54.4	102.6	569	0.00	0.00	0.038	0.00006
09-09-94	29	900	23.7	6.44	7.08							
09-10-94	30	900	24.2	6.46	6.47							
09-11-94	31	800	23.0	6.47	6.27							
09-12-94	32	500	23.7	6.63	6.55							

09-13-94	33	700	23.8	6.50	6.97							
09-14-94	34	1400	26.6	6.49	5.59							
09-15-94	35	1300	25.8	6.77	6.58							
09-16-94	36	1200	25.2	6.20	5.65	27.2	102.6	758	0.00	0.00	0.053	0.00005
09-17-94	37	820	25.2	6.10	5.72							
09-18-94	38	830	25.3	6.43	5.59							
09-19-94	39	1000	24.3	6.59	6.08							
09-20-94	40	1000	24.0	6.45	6.10							
09-21-94	41	1000	25.3	6.49	6.16							
09-22-94	42	900	24.2	6.47	6.19	54.4	119.7	652	0.00	0.00	a	a
09-23-94	43	1000	23.8	6.23	6.85							
09-24-94	44	845	24.0	6.27	6.10							
09-25-94	45	1300	24.8	a	6.30							
09-26-94	46	900	26.0	6.32	4.93							
09-27-94	47	800	24.9	6.07	6.11							
09-28-94	48	1000	24.2	6.12	5.63	34.0	102.6	780	a	a	a	a
09-29-94	49	1030	26.2	6.46	3.88							
09-30-94	50	1030	22.9	6.35	6.67							
10-01-94	51	900	23.6	6.49	6.36							
10-02-94	52	915	23.3	6.38	6.14							
10-03-94	53	1100	22.3	6.31	6.74							
10-04-94	54	1100	23.0	6.35	6.80							
10-05-94	55	1000	23.8	6.40	6.81							
10-06-94	56	800	22.9	6.46	6.89	54.4	119.7	730	0.00	0.00	a	a
10-07-94	57	1100	23.7	6.38	7.44						0.037	0.00005
10-08-94	58	1100	24.4	6.39	7.36							
10-09-94	59	1100	26.5	6.34	6.12							
10-10-94	60	1000	24.3	6.40	5.96							
10-11-94	61	1600	24.9	6.84	5.53							
10-12-94	62	900	21.9	6.44	7.53							
10-13-94	63	1300	23.8	6.33	7.18	40.8	239.4	1686	0.00	0.00	a	a
10-14-94	64	1300	24.1	6.32	6.58							
10-15-94	65	900	24.2	6.44	6.90							
10-16-94	66	900	23.3	5.91	7.58							
10-17-94	67	1000	22.8	6.33	7.70							
10-18-94	68	800	23.1	5.93	7.32							
10-19-94	69	900	23.9	5.92	7.53							
10-20-94	70	900	23.3	6.05	6.58	27.2	410.4	>1999	0.00	0.00	0.035	0.00002
10-21-94	71	900	21.2	6.22	7.62							
10-22-94	72	800	21.8	6.31	7.37							
10-23-94	73	900	23.2	6.16	7.16							
10-24-94	74	900	22.3	6.27	6.63							
10-25-94	75	900	21.8	6.20	7.28							
10-26-94	76	800	21.1	6.30	6.94							

10-27-94	77	1100	21.2	6.33	7.27	40.8	119.7	756	0.00	0.00	0.070	0.00006
10-28-94	78	1000	20.7	6.40	7.56							
10-29-94	79	900	20.7	6.33	7.46							
10-30-94	80	900	21.3	6.34	7.57							
10-31-94	81	1000	22.2	6.36	7.15							
11-01-94	82	1100	25.0	6.34	5.80							
11-02-94	83	1000	21.7	6.29	6.88							
11-03-94	84	1000	21.0	6.36	6.46							
11-04-94	85	1000	21.8	6.41	6.36	54.4	153.9	845	0.00	0.00	0.190	0.00022
11-05-94	86	1000	22.2	6.37	7.34							
11-06-94	87	1000	24.0	6.30	6.65							
11-07-94	88	700	21.6	6.36	6.91							
11-08-94	89	1000	20.5	6.44	7.69							
11-09-94	90	1000	21.8	6.36	7.10							
11-10-94	91	1100	22.0	6.38	6.60							
11-11-94	92	900	19.5	6.30	7.15	40.8	153.9	830	0.00	0.00	0.095	0.00007
11-12-94	93	845	19.0	6.28	7.31							
11-13-94	94	830	21.1	6.35	7.38							
11-14-94	95	1000	21.4	6.28	7.03							
11-15-94	96	900	21.9	6.20	6.97							
11-16-94	97	900	21.6	6.30	6.46	40.8	136.8	939	0.00	0.00	0.068	0.00006
11-17-94	98	900	21.2	6.34	6.92							
11-18-94	99	900	24.3	6.00	6.85							
11-19-94	100	800	22.8	6.15	6.40							
11-20-94	101	900	22.6	6.32	6.74							
11-21-94	102	600	22.2	6.31	6.84							
11-22-94	103	600	23.7	6.20	6.59							
11-23-94	104	800	19.7	6.29	7.80	40.8	102.6	1640	0.00	0.00	0.084	0.00006
11-24-94	105	730	22.9	6.30	7.96							
11-25-94	106	1020	22.8	6.24	8.69							
11-26-94	107	1000	20.6	6.31	7.15							
11-27-94	108	900	20.7	6.23	8.16							
11-28-94	109	900	22.1	6.06	8.12							
11-29-94	110	900	21.7	6.16	7.61							
11-30-94	111	900	21.7	6.19	7.59							
12-01-94	112	900	21.2	6.15	7.80	34.0	102.6	419	0.00	0.00	0.110	0.00007
12-02-94	113	1000	22.1	6.27	8.27							
12-03-94	114	1000	21.7	6.25	7.59							
12-04-94	115	1100	23.1	6.29	7.13							
12-05-94	116	900	24.9	6.20	6.53							
12-06-94	117	900	23.7	6.26	6.64							
12-07-94	118	800	23.3	6.27	7.32							
12-08-94	119	1100	26.1	6.40	5.67	40.8	102.6	459	0.00	0.00	0.075	0.00012
12-09-94	120	1000	23.0	6.41	6.89							

12-10-94	121	1300	23.2	6.35	7.42							
12-11-94	122	900	31.2	6.40	3.45							
12-12-94	123	900	24.4	6.82	7.65							
12-13-94	124	900	24.3	6.92	7.86							
12-14-94	125	900	24.2	6.89	7.97							
12-15-94	126	800	21.5	6.34	8.81	34.0	342.0	>1999	0.00	0.00	0.100	0.00010
12-16-94	127	1100	22.6	6.26	7.93							
12-17-94	128	845	22.7	6.27	7.83							
12-18-94	129	930	22.8	6.27	7.34							
12-19-94	130	1000	23.1	6.27	7.25							
12-20-94	131	1100	22.7	6.40	7.77							
12-21-94	132	1000	20.1	6.30	8.70	40.8	239.4	1594	0.00	0.00	0.091	0.00007
12-22-94	133	800	27.8	6.65	6.17							
12-23-94	134	1000	27.8	6.48	5.25							
12-24-94	135	900	28.0	6.68	6.44							
12-25-94	136	700	25.2	6.98	7.44							
12-26-94	137	1000	25.5	6.92	7.35							
12-27-94	138	1100	21.8	6.32	7.96							
12-28-94	139	1000	21.9	6.30	8.66							
12-29-94	140	900	21.1	6.29	7.83	40.8	188.1	971	0.00	0.00	0.074	0.00006
12-30-94	141	1000	28.1	6.43	6.21							
12-31-94	142	1000	28.1	6.73	3.09							
01-01-95	143	1100	22.1	6.38	7.80							
01-02-95	144	1000	21.5	6.35	7.65							
01-03-95	145	1100	22.8	6.37	6.77							
01-04-95	146	900	20.4	6.38	8.34							
01-05-95	147	1100	26.3	6.79	4.43	54.4	102.6	528	0.00	0.00	0.071	0.00027
01-06-95	148	1000	23.8	6.86	7.29							
01-07-95	149	1130	24.5	6.67	7.98							
01-08-95	150	1030	24.2	6.91	7.71							
01-09-95	151	1000	24.3	6.88	8.27							
01-10-95	152	1000	21.1	6.20	8.40							
01-11-95	153	1000	21.4	6.30	7.65							
01-12-95	154	1100	22.4	6.16	7.07	34.0	119.7	451	0.00	0.00	0.040	0.00003
01-13-95	155	1000	22.6	6.06	7.08							
01-14-95	156	900	23.7	6.30	6.63							
01-15-95	157	800	26.2	6.51	5.85							
01-16-95	158	1030	25.0	6.35	6.16							
01-17-95	159	1000	24.8	6.40	6.99							
01-18-95	160	1000	25.1	6.73	5.91							
01-19-95	161	1000	25.3	6.67	6.65	54.4	410.4	>1999	0.00	0.00	a	a
01-20-95	162	1000	25.7	6.15	6.06							
01-21-95	163	1000	25.4	6.21	6.01							
01-22-95	164	1100	24.4	6.48	6.75							

01-23-95	165	600	22.7	6.31	7.81							
01-24-95	166	1000	23.6	6.30	8.00							
01-25-95	167	1100	24.9	6.36	5.44							
01-26-95	168	1000	22.4	6.30	7.12	34.0	85.5	373	0.00	0.00	0.040	0.00004
01-27-95	169	1000	21.5	6.20	7.74							
01-28-95	170	830	22.2	6.30	7.39							
01-29-95	171	900	24.3	6.30	7.01							
01-30-95	172	1000	22.1	6.43	7.83							
01-31-95	173	1000	21.3	6.92	7.71							
02-01-95	174	1000	20.6	6.46	8.29							
02-02-95	175	900	22.1	6.40	7.45	40.8	136.8	617	0.00	0.00	0.093	0.00011
02-03-95	176	930	26.2	6.52	3.05							
02-04-95	177	1000	20.2	6.54	8.99							
02-05-95	178	1200	25.1	6.64	3.86							
02-06-95	179	930	22.5	6.87	7.66							
02-07-95	180	900	23.0	6.86	7.68							
02-08-95	181	900	22.9	6.68	8.10							
02-09-95	182	900	22.2	6.56	8.38	40.8	85.5	295	0.00	0.00	0.012	0.00002
02-10-95	183	900	22.4	6.53	7.94							
02-11-95	184	900	22.0	6.36	8.55							
02-12-95	185	1200	22.0	6.18	8.74							
02-13-95	186	900	21.8	6.46	8.84							
02-14-95	187	900	21.9	6.34	8.52							
02-15-95	188	900	21.7	6.23	8.66							
02-16-95	189	900	21.9	6.20	8.80	34.0	85.5	293	0.00	0.00	0.027	0.00002
02-17-95	190	900	23.4	6.28	8.40							
02-18-95	191	1100	23.5	6.22	8.97							
02-19-95	192	1400	23.6	6.17	8.85							
02-20-95	193	1000	23.5	6.30	8.47							
02-21-95	194	1000	23.4	6.25	8.48							
02-22-95	195	900	23.3	6.34	8.38							
02-23-95	196	1000	24.2	6.33	8.52	27.2	85.5	295	0.00	0.00	0.052	0.00006
02-24-95	197	1000	23.9	6.33	8.22							
02-25-95	198	1000	23.9	6.34	8.32							
02-26-95	199	1800	24.1	6.41	8.40							
02-27-95	200	900	24.0	6.28	8.23							
02-28-95	201	900	24.5	6.38	8.23							
03-01-95	202	900	24.5	6.39	8.09							
03-02-95	203	900	24.4	6.39	8.22	27.2	85.5	374	0.00	0.00	0.013	0.00002
03-03-95	204	900	24.2	6.35	7.99							
03-04-95	205	1000	23.3	6.37	7.96							
03-05-95	206	1015	23.5	6.39	8.03							
03-06-95	207	900	23.4	6.34	7.89							
03-07-95	208	900	23.6	6.28	7.73							

03-08-95	209	900	23.4	6.37	7.64							
03-09-95	210	1000	23.7	6.35	7.61	34.0	85.5	298	0.00	0.00	0.015	0.00002
03-10-95	211	900	25.0	6.32	7.42							
03-11-95	212	1100	24.2	6.30	7.81							
03-12-95	213	1800	25.3	6.30	7.68							
03-13-95	214	900	24.5	6.30	7.41							
03-14-95	215	900	24.6	6.30	7.78							
03-15-95	216	900	23.9	6.28	7.75							
03-16-95	217	900	25.0	6.29	7.80	34.0	85.5	269	0.00	0.00	0.011	0.00001
03-17-95	218	900	25.1	6.30	7.67							
03-18-95	219	1000	25.2	6.32	7.50							
03-19-95	220	1600	25.8	6.34	7.56							
03-20-95	221	900	24.8	6.31	7.45							
03-21-95	222	900	25.1	6.28	7.56							
03-22-95	223	900	25.0	6.27	7.59							
03-23-95	224	1100	24.9	6.31	7.44	40.8	85.5	293	0.00	0.00	a	a
03-24-95	225	900	24.8	6.31	6.58							
03-25-95	226	915	24.9	6.37	7.26							
03-26-95	227	900	24.7	6.41	7.99							
03-27-95	228	900	24.8	6.29	7.33							
03-28-95	229	900	24.6	6.29	7.23							
03-29-95	230	900	24.5	6.30	7.00							
03-30-95	231	900	24.6	6.33	6.91	40.8	85.5	278	0.00	0.00	0.067	0.00007
03-31-95	232	900	24.6	6.35	6.72							
04-01-95	233	900	24.4	6.40	7.15							
04-02-95	234	1000	24.5	6.40	7.61							
04-03-95	235	900	24.1	6.34	7.62							
04-04-95	236	900	24.6	6.39	7.29							
04-05-95	237	900	23.7	6.31	7.15							
04-06-95	238	900	24.2	6.38	7.37	34.0	85.5	288	0.00	0.00	0.054	0.00005
04-07-95	239	900	24.5	6.39	7.36							
04-08-95	240	1100	24.7	6.37	7.46							
04-09-95	241	1300	25.2	6.36	7.80							
04-10-95	242	900	24.8	6.32	6.90							
04-11-95	243	900	25.1	6.39	7.50							
04-12-95	244	900	25.2	6.39	7.37							
04-13-95	245	1100	25.1	6.41	7.30	34.0	85.5	305	0.00	0.00	0.043	0.00005
04-14-95	246	900	25.1	6.37	7.03							
04-15-95	247	1400	25.3	6.42	7.78							
04-16-95	248	1100	24.9	6.34	7.54							
04-17-95	249	900	24.7	6.41	7.57							
04-18-95	250	900	24.6	6.39	7.78							
04-19-95	251	900	25.0	6.44	7.73							
04-20-95	252	900	25.0	6.37	7.56	34.0	68.4	277	0.00	0.00	a	a

04-21-95	253	900	25.2	6.43	7.39							
04-22-95	254	1200	25.4	6.42	7.31							
04-23-95	255	2000	25.2	6.40	7.50							
04-24-95	256	900	24.5	6.49	7.39							
04-25-95	257	900	24.5	6.40	7.15							
04-26-95	258	900	24.3	6.46	7.18							
04-27-95	259	900	25.0	6.44	7.24	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.2	6.41	7.08							
04-29-95	261	1100	25.1	6.42	6.84							
04-30-95	262	1600	24.7	6.41	7.03							
05-01-95	263	900	25.1	6.45	7.98							
05-02-95	264	900	25.0	6.45	8.41							
05-03-95	265	900	24.9	6.46	7.34							
05-04-95	266	900	24.8	6.48	7.67	34.0	85.5	286	0.00	0.00	a	a
05-05-95	267	900	25.0	6.46	7.50							
05-06-95	268	830	24.9	6.48	7.39							
05-07-95	269	900	24.9	6.51	7.47							
05-08-95	270	900	24.9	6.44	7.67							
05-09-95	271	900	24.9	6.52	7.59							
05-10-95	272	900	25.3	6.33	7.65							
MEAN			23.7		7.10	39.2	134.6				0.071	0.00008
MINIMUM			19.0	5.80	3.05	27.2	68.4	269	0.00	0.00	0.011	0.00001
MAXIMUM			31.2	6.98	8.99	54.4	410.4	>1999	0.00	0.00	0.314	0.00056
Std Dev			1.64		0.976	8.02	83.88				0.0588	0.000105
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 17
TANK CONCENTRATION: 100% APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.66	9.09							
08-13-94	2	900	25.0	7.31	7.65							
08-14-94	3	900	25.2	7.57	7.82							
08-15-94	4	900	24.8	7.37	8.13							
08-16-94	5	1000	25.0	7.44	7.70							
08-17-94	6	1000	25.0	7.24	7.43							
08-18-94	7	900	25.0	7.33	7.48	40.8	85.5	203	0.00	0.00	0.337	0.00404
08-19-94	8	800	24.8	7.31	8.29							
08-20-94	9	1000	24.9	7.34	8.24							
08-21-94	10	800	25.0	7.44	8.12							
08-22-94	11	900	24.9	7.50	8.15							
08-23-94	12	730	24.6	7.41	8.17							
08-24-94	13	1000	24.6	7.37	8.40							
08-25-94	14	1100	24.6	7.42	8.59	40.8	85.5	206	0.00	0.00	0.025	0.00036
08-26-94	15	900	24.7	7.38	8.32							
08-27-94	16	900	24.7	7.39	8.28							
08-28-94	17	800	24.7	7.38	8.25							
08-29-94	18	900	25.1	7.45	8.21							
08-30-94	19	900	24.6	7.45	8.24							
08-31-94	20	800	24.7	7.49	8.32							
09-01-94	21	1100	24.9	7.47	8.92	40.8	85.5	218	0.00	0.00	a	a
09-02-94	22	900	24.6	7.47	8.84							
09-03-94	23	815	24.4	7.38	8.27							
09-04-94	24	810	24.4	7.40	8.44							
09-05-94	25	1100	24.4	7.38	8.96							
09-06-94	26	900	24.1	7.37	8.96							
09-07-94	27	800	24.2	7.39	8.99							
09-08-94	28	1100	24.1	7.37	9.20	40.8	85.5	213	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.1	7.31	9.77							
09-10-94	30	900	24.3	7.49	9.24							
09-11-94	31	800	23.8	7.37	8.81							
09-12-94	32	500	23.9	7.42	8.38							

09-13-94	33	700	24.1	7.35	9.10							
09-14-94	34	1400	24.7	7.44	8.79							
09-15-94	35	1300	24.7	7.39	8.52							
09-16-94	36	1200	24.8	7.34	8.61	40.8	85.5	210	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.23	8.52							
09-18-94	38	830	24.9	7.28	8.60							
09-19-94	39	1000	24.5	7.28	8.74							
09-20-94	40	1000	24.5	7.33	8.86							
09-21-94	41	1000	24.7	7.32	8.85							
09-22-94	42	900	24.8	7.30	8.49	40.8	85.5	215	0.00	0.00	a	a
09-23-94	43	1000	24.8	7.36	9.02							
09-24-94	44	845	24.5	7.29	8.64							
09-25-94	45	1300	24.8	a	8.72							
09-26-94	46	900	24.7	7.18	8.37							
09-27-94	47	800	24.7	7.17	8.84							
09-28-94	48	1000	24.6	7.00	8.11	34.0	68.4	181	a	a	a	a
09-29-94	49	1030	24.6	7.18	7.95							
09-30-94	50	1030	24.2	7.26	8.77							
10-01-94	51	900	24.0	7.16	8.05							
10-02-94	52	915	24.3	7.24	9.07							
10-03-94	53	1100	23.9	7.23	9.22							
10-04-94	54	1100	23.8	7.22	9.02							
10-05-94	55	1000	24.2	7.20	9.23							
10-06-94	56	800	23.8	7.20	8.52	40.8	85.5	202	0.00	0.00	a	a
10-07-94	57	1100	24.2	7.18	9.22						0.022	0.00018
10-08-94	58	1100	24.3	7.13	9.50							
10-09-94	59	1100	24.4	7.16	8.89							
10-10-94	60	1000	24.0	7.16	8.54							
10-11-94	61	1600	24.3	7.19	8.30							
10-12-94	62	900	23.7	7.18	8.88							
10-13-94	63	1300	24.4	7.14	8.54	40.8	85.5	206	0.00	0.00	a	a
10-14-94	64	1300	25.7	7.06	7.49							
10-15-94	65	900	25.1	7.16	7.90							
10-16-94	66	900	24.6	7.20	8.16							
10-17-94	67	1000	24.7	7.16	8.54							
10-18-94	68	800	24.5	7.00	7.92							
10-19-94	69	900	24.7	7.24	8.35							
10-20-94	70	900	24.2	7.13	8.20	40.8	85.5	207	0.00	0.00	0.024	0.00017
10-21-94	71	900	22.3	7.18	9.44							
10-22-94	72	800	23.9	7.23	8.70							
10-23-94	73	900	24.4	7.22	9.08							
10-24-94	74	900	24.2	7.22	8.57							
10-25-94	75	900	24.3	7.20	8.42							
10-26-94	76	800	24.1	7.22	8.60							

10-27-94	77	1100	24.9	7.23	8.72	40.8	85.5	200	0.00	0.00	0.025	0.00024
10-28-94	78	1000	24.7	7.28	8.82							
10-29-94	79	900	24.6	7.23	8.10							
10-30-94	80	900	25.0	7.24	8.90							
10-31-94	81	1000	25.0	7.20	9.31							
11-01-94	82	1100	25.4	7.17	9.07							
11-02-94	83	1000	25.0	7.23	9.04							
11-03-94	84	1000	24.8	7.13	8.04							
11-04-94	85	1000	25.1	7.11	8.25	40.8	85.5	212	0.00	0.00	0.059	0.00043
11-05-94	86	1000	25.1	7.30	9.20							
11-06-94	87	1000	25.3	7.16	8.92							
11-07-94	88	700	24.8	7.19	9.22							
11-08-94	89	1000	24.8	7.15	9.08							
11-09-94	90	1000	25.0	7.15	9.02							
11-10-94	91	1100	24.9	7.14	7.97							
11-11-94	92	900	24.4	7.14	8.17	40.8	85.5	215	0.00	0.00	0.062	0.00046
11-12-94	93	845	24.2	7.11	8.00							
11-13-94	94	830	24.3	7.12	8.43							
11-14-94	95	1000	24.5	7.12	8.72							
11-15-94	96	900	24.8	7.12	8.75							
11-16-94	97	900	24.8	7.18	8.22	40.8	85.5	198	0.00	0.00	0.042	0.00035
11-17-94	98	900	24.9	7.20	8.34							
11-18-94	99	900	25.1	7.15	8.19							
11-19-94	100	800	25.0	7.20	8.10							
11-20-94	101	900	24.8	7.18	8.37							
11-21-94	102	600	24.7	7.23	8.51							
11-22-94	103	600	24.9	7.23	8.32							
11-23-94	104	800	22.4	7.44	9.01	54.4	85.5	195	0.00	0.00	0.047	0.00060
11-24-94	105	730	22.9	7.09	8.27							
11-25-94	106	1020	22.6	7.11	9.76							
11-26-94	107	1000	22.6	7.17	8.87							
11-27-94	108	900	21.9	7.17	9.15							
11-28-94	109	900	22.8	7.16	9.05							
11-29-94	110	900	22.1	7.02	9.13							
11-30-94	111	900	22.2	6.98	8.97							
12-01-94	112	900	21.8	7.02	8.90	34.0	85.5	174	0.00	0.00	0.072	0.00034
12-02-94	113	1000	26.3	7.04	8.47							
12-03-94	114	1000	24.7	6.94	8.07							
12-04-94	115	1100	25.0	7.05	8.27							
12-05-94	116	900	25.2	7.12	7.89							
12-06-94	117	900	25.2	7.51	7.99							
12-07-94	118	800	25.2	7.53	8.83							
12-08-94	119	1100	25.3	7.57	7.82	88.4	85.5	266	0.00	0.00	0.044	0.00093
12-09-94	120	1000	25.2	7.60	7.72							

12-10-94	121	1300	25.5	7.57	7.56							
12-11-94	122	900	25.6	7.56	7.73							
12-12-94	123	900	24.6	7.55	8.25							
12-13-94	124	900	24.3	7.62	8.42							
12-14-94	125	900	24.3	7.60	8.51							
12-15-94	126	800	25.2	7.55	8.28	81.6	68.4	261	0.00	0.00	0.081	0.00163
12-16-94	127	1100	25.0	7.53	7.93							
12-17-94	128	845	25.2	7.45	7.58							
12-18-94	129	930	25.2	7.40	7.47							
12-19-94	130	1000	25.4	7.55	7.57							
12-20-94	131	1100	25.2	7.53	7.92							
12-21-94	132	1000	24.9	7.40	7.85	81.6	85.5	254	0.00	0.00	0.091	0.00127
12-22-94	133	800	24.9	7.62	7.73							
12-23-94	134	1000	25.1	7.55	7.73							
12-24-94	135	900	25.2	7.68	7.84							
12-25-94	136	700	24.3	7.64	8.40							
12-26-94	137	1000	24.3	7.52	8.23							
12-27-94	138	1100	24.7	7.68	8.10							
12-28-94	139	1000	24.8	7.56	8.51							
12-29-94	140	900	24.9	7.60	7.68	95.2	85.5	277	0.00	0.00	0.065	0.00143
12-30-94	141	1000	24.6	7.53	7.81							
12-31-94	142	1000	24.7	7.44	7.75							
01-01-95	143	1100	25.0	7.56	7.72							
01-02-95	144	1000	25.0	7.62	7.70							
01-03-95	145	1100	24.6	7.50	8.30							
01-04-95	146	900	24.7	7.61	7.85							
01-05-95	147	1100	24.3	7.61	8.86	95.2	68.4	280	0.00	0.00	0.047	0.00101
01-06-95	148	1000	23.4	7.43	8.62							
01-07-95	149	1130	23.8	7.49	9.19							
01-08-95	150	1030	23.7	7.65	9.00							
01-09-95	151	1000	23.6	7.61	9.61							
01-10-95	152	1000	24.3	7.65	8.04							
01-11-95	153	1000	24.5	7.56	7.36							
01-12-95	154	1100	24.7	7.61	7.20	102.0	102.6	292	0.00	0.00	0.037	0.00082
01-13-95	155	1000	24.6	7.60	7.43							
01-14-95	156	900	25.2	7.54	7.48							
01-15-95	157	800	25.7	7.52	7.49							
01-16-95	158	1030	25.5	7.54	7.42							
01-17-95	159	1000	25.0	7.54	8.01							
01-18-95	160	1000	24.8	7.62	7.28							
01-19-95	161	1000	24.9	7.61	7.25	88.4	102.6	282	0.00	0.00	a	a
01-20-95	162	1000	25.1	7.62	7.07							
01-21-95	163	1000	25.6	7.58	6.94							
01-22-95	164	1100	25.4	7.62	6.88							

01-23-95	165	600	25.1	7.69	7.50							
01-24-95	166	1000	25.2	7.64	8.14							
01-25-95	167	1100	23.0	7.70	7.37							
01-26-95	168	1100	23.5	7.63	7.33	95.2	85.5	285	0.00	0.00	0.020	0.00043
01-27-95	169	1000	23.5	7.55	7.38							
01-28-95	170	830	24.5	7.51	7.25							
01-29-95	171	900	24.0	7.63	7.94							
01-30-95	172	1000	24.4	7.43	7.59							
01-31-95	173	1000	23.1	7.52	8.12							
02-01-95	174	1000	25.9	7.55	7.27							
02-02-95	175	900	26.0	7.58	7.67	88.4	85.5	281	0.00	0.00	0.052	0.00118
02-03-95	176	930	25.5	7.52	7.64							
02-04-95	177	1000	25.6	7.50	7.96							
02-05-95	178	1200	24.7	7.35	7.96							
02-06-95	179	930	22.2	7.52	8.50							
02-07-95	180	900	23.3	7.52	8.27							
02-08-95	181	900	23.3	7.33	8.31							
02-09-95	182	900	21.6	7.36	9.19	47.6	119.7	244	0.00	0.00	0.015	0.00015
02-10-95	183	900	22.4	7.20	8.73							
02-11-95	184	900	21.6	7.13	9.42							
02-12-95	185	1200	21.3	7.06	9.73							
02-13-95	186	900	20.6	7.19	9.62							
02-14-95	187	900	20.5	7.15	9.52							
02-15-95	188	900	21.2	7.10	9.49							
02-16-95	189	900	21.5	7.10	9.44	40.8	85.5	239	0.00	0.00	0.027	0.00015
02-17-95	190	900	20.9	7.09	9.29							
02-18-95	191	1100	20.6	7.09	10.06							
02-19-95	192	1400	21.4	7.01	9.98							
02-20-95	193	1000	21.0	7.07	9.49							
02-21-95	194	1000	21.2	7.20	9.39							
02-22-95	195	900	21.1	7.24	9.32							
02-23-95	196	1000	22.0	7.23	9.28	34.0	85.5	233	0.00	0.00	0.038	0.00030
02-24-95	197	1000	21.7	7.23	9.10							
02-25-95	198	1000	21.1	7.20	9.24							
02-26-95	199	1800	21.5	7.34	9.57							
02-27-95	200	900	21.4	7.18	9.18							
02-28-95	201	900	22.2	7.19	9.24							
03-01-95	202	900	22.2	7.11	9.16							
03-02-95	203	900	21.7	7.18	9.20	40.8	85.5	336	0.00	0.00	0.013	0.00009
03-03-95	204	900	21.9	7.23	9.04							
03-04-95	205	1000	22.9	7.23	8.86							
03-05-95	206	1015	22.9	6.99	8.98							
03-06-95	207	900	23.0	7.16	8.96							
03-07-95	208	900	23.8	7.17	8.65							

03-08-95	209	900	23.6	7.27	8.64							
03-09-95	210	1000	23.3	7.24	8.59	40.8	85.5	242	0.00	0.00	0.015	0.00013
03-10-95	211	900	24.5	7.07	8.47							
03-11-95	212	1100	23.7	7.13	8.86							
03-12-95	213	1800	24.8	7.14	8.60							
03-13-95	214	900	23.8	7.20	8.49							
03-14-95	215	900	23.9	7.23	8.58							
03-15-95	216	900	24.0	7.16	8.56							
03-16-95	217	900	24.5	7.15	8.60	47.6	85.5	214	0.00	0.00	0.011	0.00008
03-17-95	218	900	24.7	7.17	8.49							
03-18-95	219	1000	24.3	7.23	8.26							
03-19-95	220	1600	25.3	7.21	8.33							
03-20-95	221	900	24.6	7.17	8.26							
03-21-95	222	900	24.8	7.16	7.92							
03-22-95	223	900	24.9	7.17	8.20							
03-23-95	224	1100	24.8	7.14	8.03	47.6	85.5	233	0.00	0.00	a	a
03-24-95	225	900	24.7	7.07	7.19							
03-25-95	226	915	25.0	7.04	7.88							
03-26-95	227	900	24.8	6.97	8.70							
03-27-95	228	900	24.9	7.12	8.06							
03-28-95	229	900	24.7	7.15	7.70							
03-29-95	230	900	24.5	7.19	7.50							
03-30-95	231	900	24.5	7.15	7.41	47.6	85.5	219	0.00	0.00	0.064	0.00041
03-31-95	232	900	24.9	7.16	7.36							
04-01-95	233	900	24.2	7.02	7.81							
04-02-95	234	1000	24.2	7.03	8.41							
04-03-95	235	900	24.0	7.21	8.26							
04-04-95	236	900	24.6	7.25	7.83							
04-05-95	237	900	24.1	7.20	7.59							
04-06-95	238	900	24.3	7.22	7.80	40.8	85.5	288	0.00	0.00	0.054	0.00034
04-07-95	239	900	24.5	7.19	7.80							
04-08-95	240	1100	24.7	7.19	8.05							
04-09-95	241	1300	25.3	7.16	8.30							
04-10-95	242	900	24.8	7.16	7.28							
04-11-95	243	900	25.0	7.22	7.47							
04-12-95	244	900	25.3	7.18	7.31							
04-13-95	245	1100	25.3	7.22	7.21	40.8	85.5	245	0.00	0.00	0.044	0.00031
04-14-95	246	900	24.9	7.13	7.00							
04-15-95	247	1400	25.4	7.25	7.80							
04-16-95	248	1100	25.3	7.22	7.67							
04-17-95	249	900	25.1	7.29	7.53							
04-18-95	250	900	25.1	7.23	7.62							
04-19-95	251	900	25.3	7.26	7.69							
04-20-95	252	900	25.2	7.20	7.62	40.8	68.4	222	0.00	0.00	a	a

04-21-95	253	900	25.5	7.27	7.30							
04-22-95	254	1200	26.0	7.25	7.45							
04-23-95	255	2000	25.4	7.21	7.87							
04-24-95	256	900	24.7	7.31	7.27							
04-25-95	257	900	24.8	7.24	7.16							
04-26-95	258	900	24.5	7.23	7.13							
04-27-95	259	900	25.2	7.27	6.97	40.8	85.5	222	0.00	0.00	a	a
04-28-95	260	900	25.1	7.26	7.11							
04-29-95	261	1100	25.1	7.25	6.97							
04-30-95	262	1600	25.1	7.24	7.76							
05-01-95	263	900	25.0	7.22	7.86							
05-02-95	264	900	24.9	7.26	8.51							
05-03-95	265	900	24.6	7.28	7.43							
05-04-95	266	900	24.9	7.27	7.74	40.8	85.5	224	0.00	0.00	a	a
05-05-95	267	900	25.3	7.27	7.68							
05-06-95	268	830	25.2	7.16	7.15							
05-07-95	269	900	25.3	7.05	7.29							
05-08-95	270	900	25.3	7.10	7.64							
05-09-95	271	900	25.3	7.14	7.14							
05-10-95	272	900	25.9	7.16	7.11							
MEAN			24.3		8.30	53.1	85.5	234			0.049	0.00061
MINIMUM			20.5	6.94	6.88	34.0	68.4	174	0.00	0.00	0.000	0.00000
MAXIMUM			26.3	7.70	10.06	102.0	119.7	336	0.00	0.00	0.337	0.00404
Std Dev			1.14		0.688	21.44	8.77	35.7			0.0590	0.000779
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 18
TANK CONCENTRATION: 100% APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.63	9.10							
08-13-94	2	900	25.0	7.31	7.93							
08-14-94	3	900	25.2	7.56	7.95							
08-15-94	4	900	24.8	7.37	8.22							
08-16-94	5	1000	25.0	7.43	7.83							
08-17-94	6	1000	25.0	7.22	7.55							
08-18-94	7	900	25.0	7.32	7.50	40.8	85.5	203	0.00	0.00	0.112	0.00131
08-19-94	8	800	24.8	7.31	8.29							
08-20-94	9	1000	24.9	7.34	8.22							
08-21-94	10	800	25.0	7.44	8.16							
08-22-94	11	900	24.9	7.50	8.13							
08-23-94	12	730	24.6	7.40	8.17							
08-24-94	13	1000	24.5	7.36	8.39							
08-25-94	14	1100	24.5	7.41	8.60	40.8	85.5	206	0.00	0.00	0.079	0.00110
08-26-94	15	900	24.6	7.38	8.37							
08-27-94	16	900	24.7	7.39	8.27							
08-28-94	17	800	24.7	7.38	8.23							
08-29-94	18	900	25.1	7.45	8.16							
08-30-94	19	900	24.5	7.45	8.24							
08-31-94	20	800	24.7	7.49	8.29							
09-01-94	21	1100	24.9	7.47	8.89	40.8	85.5	218	0.00	0.00	a	a
09-02-94	22	900	24.6	7.47	8.80							
09-03-94	23	815	24.4	7.33	8.08							
09-04-94	24	810	24.4	7.41	8.29							
09-05-94	25	1100	24.4	7.38	8.91							
09-06-94	26	900	24.1	7.37	8.91							
09-07-94	27	800	24.2	7.39	8.98							
09-08-94	28	1100	24.0	7.37	9.20	40.8	85.5	213	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.1	7.31	9.80							
09-10-94	30	900	24.2	7.49	9.21							
09-11-94	31	800	23.8	7.37	8.78							
09-12-94	32	500	23.9	7.42	8.37							

09-13-94	33	700	24.0	7.35	9.07							
09-14-94	34	1400	24.7	7.43	8.68							
09-15-94	35	1300	24.7	7.37	8.43							
09-16-94	36	1200	24.8	7.33	8.55	40.8	85.5	210	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.23	8.28							
09-18-94	38	830	24.9	7.23	8.61							
09-19-94	39	1000	24.4	7.29	8.66							
09-20-94	40	1000	24.4	7.33	8.78							
09-21-94	41	1000	24.7	7.33	8.74							
09-22-94	42	900	24.8	7.30	8.44	40.8	85.5	215	0.00	0.00	a	a
09-23-94	43	1000	24.8	7.36	9.00							
09-24-94	44	845	24.5	7.28	8.57							
09-25-94	45	1300	24.8	a	8.70							
09-26-94	46	900	24.6	7.18	8.31							
09-27-94	47	800	24.7	7.17	8.78							
09-28-94	48	1000	24.6	7.00	8.07	34.0	68.4	181	a	a	a	a
09-29-94	49	1030	24.6	7.17	7.78							
09-30-94	50	1030	24.3	7.27	8.73							
10-01-94	51	900	24.0	7.18	7.96							
10-02-94	52	915	24.3	7.23	9.01							
10-03-94	53	1100	23.9	7.23	9.11							
10-04-94	54	1100	23.8	7.22	8.94							
10-05-94	55	1000	24.2	7.20	9.08							
10-06-94	56	800	23.8	7.20	8.40	40.8	85.5	202	0.00	0.00	a	a
10-07-94	57	1100	24.3	7.18	9.09						0.020	0.00016
10-08-94	58	1100	24.4	7.13	9.35							
10-09-94	59	1100	24.5	7.16	8.76							
10-10-94	60	1000	24.1	7.16	8.43							
10-11-94	61	1600	24.4	7.19	8.15							
10-12-94	62	900	23.7	7.18	8.77							
10-13-94	63	1300	24.4	7.14	8.40	40.8	85.5	206	0.00	0.00	a	a
10-14-94	64	1300	25.8	7.06	7.37							
10-15-94	65	900	25.2	7.16	7.82							
10-16-94	66	900	24.7	7.20	8.10							
10-17-94	67	1000	24.7	7.16	8.49							
10-18-94	68	800	24.6	7.00	7.86							
10-19-94	69	900	24.8	7.24	8.26							
10-20-94	70	900	24.3	7.13	8.10	40.8	85.5	207	0.00	0.00	0.026	0.00019
10-21-94	71	900	22.5	7.18	9.33							
10-22-94	72	800	24.0	7.23	8.59							
10-23-94	73	900	24.5	7.22	8.97							
10-24-94	74	900	24.3	7.22	8.50							
10-25-94	75	900	24.5	7.20	8.33							
10-26-94	76	800	24.2	7.22	8.49							

10-27-94	77	1100	25.0	7.23	8.60	40.8	85.5	200	0.00	0.00	0.021	0.00020
10-28-94	78	1000	24.8	7.28	8.66							
10-29-94	79	900	24.7	7.23	7.98							
10-30-94	80	900	25.0	7.24	8.77							
10-31-94	81	1000	25.0	7.20	9.20							
11-01-94	82	1100	25.5	7.17	8.89							
11-02-94	83	1000	25.1	7.23	8.91							
11-03-94	84	1000	24.9	7.13	7.90							
11-04-94	85	1000	25.1	7.11	8.14	40.8	85.5	212	0.00	0.00	0.057	0.00042
11-05-94	86	1000	25.1	7.30	9.10							
11-06-94	87	1000	25.4	7.16	8.87							
11-07-94	88	700	24.8	7.19	9.15							
11-08-94	89	1000	24.9	7.15	9.00							
11-09-94	90	1000	25.0	7.15	8.88							
11-10-94	91	1100	24.9	7.14	7.82							
11-11-94	92	900	24.5	7.14	8.10	40.8	85.5	215	0.00	0.00	0.068	0.00051
11-12-94	93	845	24.3	7.12	7.90							
11-13-94	94	830	24.5	7.14	8.46							
11-14-94	95	1000	24.5	7.12	8.64							
11-15-94	96	900	24.8	7.12	8.70							
11-16-94	97	900	24.8	7.18	8.15	40.8	85.5	198	0.00	0.00	0.043	0.00036
11-17-94	98	900	25.0	7.20	8.25							
11-18-94	99	900	25.1	7.15	8.11							
11-19-94	100	800	24.9	7.20	8.16							
11-20-94	101	900	24.8	7.18	8.41							
11-21-94	102	600	24.7	7.23	8.55							
11-22-94	103	600	25.0	7.23	8.29							
11-23-94	104	800	22.4	7.44	8.96	54.4	85.5	195	0.00	0.00	0.048	0.00061
11-24-94	105	730	22.9	7.11	8.23							
11-25-94	106	1020	22.5	7.12	9.57							
11-26-94	107	1000	22.7	7.17	8.77							
11-27-94	108	900	21.9	7.17	9.03							
11-28-94	109	900	22.9	7.16	9.02							
11-29-94	110	900	22.1	7.02	9.06							
11-30-94	111	900	22.2	6.98	8.90							
12-01-94	112	900	21.7	7.02	8.87	34.0	85.5	174	0.00	0.00	0.060	0.00028
12-02-94	113	1000	26.3	7.07	8.33							
12-03-94	114	1000	24.7	6.96	7.95							
12-04-94	115	1100	25.0	7.05	8.22							
12-05-94	116	900	25.3	7.12	7.89							
12-06-94	117	900	25.2	7.51	7.97							
12-07-94	118	800	25.2	7.53	8.80							
12-08-94	119	1100	25.3	7.57	7.79	88.4	68.4	266	0.00	0.00	0.035	0.00074
12-09-94	120	1000	25.0	7.60	7.72							

12-10-94	121	1300	25.4	7.57	7.53							
12-11-94	122	900	25.4	7.56	7.76							
12-12-94	123	900	24.4	7.55	8.25							
12-13-94	124	900	24.1	7.62	8.55							
12-14-94	125	900	24.0	7.60	8.59							
12-15-94	126	800	25.0	7.55	8.25	81.6	85.5	260	0.00	0.00	0.073	0.00145
12-16-94	127	1100	24.8	7.53	7.93							
12-17-94	128	845	25.1	7.47	7.62							
12-18-94	129	930	25.1	7.44	7.49							
12-19-94	130	1000	25.3	7.55	7.49							
12-20-94	131	1100	25.0	7.53	7.92							
12-21-94	132	1000	24.8	7.40	7.94	81.6	68.4	254	0.00	0.00	0.100	0.00139
12-22-94	133	800	24.7	7.62	7.80							
12-23-94	134	1000	24.9	7.55	7.80							
12-24-94	135	900	25.0	7.68	7.90							
12-25-94	136	700	23.8	7.67	8.42							
12-26-94	137	1000	24.0	7.52	8.10							
12-27-94	138	1100	24.5	7.68	8.00							
12-28-94	139	1000	24.6	7.56	8.47							
12-29-94	140	900	24.7	7.60	7.67	95.2	85.5	275	0.00	0.00	0.056	0.00121
12-30-94	141	1000	24.5	7.53	7.75							
12-31-94	142	1000	24.6	7.44	7.70							
01-01-95	143	1100	24.8	7.56	7.71							
01-02-95	144	1000	24.9	7.62	7.73							
01-03-95	145	1100	24.5	7.50	8.32							
01-04-95	146	900	24.6	7.61	7.87							
01-05-95	147	1100	24.1	7.61	8.88	95.2	68.4	278	0.00	0.00	0.048	0.00102
01-06-95	148	1000	23.2	7.50	8.81							
01-07-95	149	1130	23.7	7.45	9.36							
01-08-95	150	1030	23.5	7.65	9.22							
01-09-95	151	1000	23.4	7.61	9.67							
01-10-95	152	1000	24.1	7.65	8.13							
01-11-95	153	1000	24.3	7.56	7.48							
01-12-95	154	1100	24.4	7.61	7.30	102.0	85.5	290	0.00	0.00	0.035	0.00076
01-13-95	155	1000	24.4	7.60	7.61							
01-14-95	156	900	25.1	7.54	7.51							
01-15-95	157	800	25.6	7.52	7.60							
01-16-95	158	1030	25.4	7.54	7.59							
01-17-95	159	1000	24.9	7.54	8.09							
01-18-95	160	1000	24.8	7.62	7.28							
01-19-95	161	1000	24.9	7.61	7.49	88.4	102.6	279	0.00	0.00	a	a
01-20-95	162	1000	25.1	7.62	7.17							
01-21-95	163	1000	25.5	7.58	7.08							
01-22-95	164	1100	25.2	7.62	7.00							

01-23-95	165	600	24.9	7.69	7.71							
01-24-95	166	1000	25.0	7.64	8.04							
01-25-95	167	1100	22.9	7.70	7.41							
01-26-95	168	1100	23.4	7.63	7.34	95.2	85.5	285	0.00	0.00	0.014	0.00030
01-27-95	169	1000	23.3	7.55	7.38							
01-28-95	170	830	24.3	7.54	7.38							
01-29-95	171	900	23.9	7.63	7.94							
01-30-95	172	1000	24.3	7.43	7.57							
01-31-95	173	1000	22.9	7.52	8.17							
02-01-95	174	1000	25.6	7.55	7.16							
02-02-95	175	900	25.9	7.58	7.63	88.4	85.5	280	0.00	0.00	0.048	0.00108
02-03-95	176	930	25.4	7.52	7.62							
02-04-95	177	1000	25.4	7.50	7.79							
02-05-95	178	1200	24.4	7.35	7.85							
02-06-95	179	930	21.8	7.52	8.69							
02-07-95	180	900	23.0	7.52	8.50							
02-08-95	181	900	23.1	7.33	8.25							
02-09-95	182	900	21.5	7.36	9.20	47.6	119.7	243	0.00	0.00	0.013	0.00013
02-10-95	183	900	22.4	7.20	8.70							
02-11-95	184	900	21.4	7.13	9.31							
02-12-95	185	1200	21.1	7.06	9.64							
02-13-95	186	900	20.4	7.19	9.73							
02-14-95	187	900	20.3	7.15	9.53							
02-15-95	188	900	21.0	7.10	9.55							
02-16-95	189	900	21.1	7.10	9.59	40.8	85.5	238	0.00	0.00	0.027	0.00015
02-17-95	190	900	20.6	7.09	9.60							
02-18-95	191	1100	20.4	7.09	10.04							
02-19-95	192	1400	21.2	7.01	9.95							
02-20-95	193	1000	20.6	7.07	9.62							
02-21-95	194	1000	20.9	7.20	9.49							
02-22-95	195	900	20.8	7.24	9.49							
02-23-95	196	1000	21.6	7.23	9.44	34.0	85.5	237	0.00	0.00	0.036	0.00030
02-24-95	197	1000	21.4	7.23	9.30							
02-25-95	198	1000	20.7	7.20	9.46							
02-26-95	199	1800	21.1	7.34	9.64							
02-27-95	200	900	21.0	7.18	9.37							
02-28-95	201	900	21.9	7.19	9.22							
03-01-95	202	900	21.9	7.11	9.21							
03-02-95	203	900	21.4	7.18	9.18	40.8	85.5	337	0.00	0.00	0.013	0.00009
03-03-95	204	900	21.3	7.23	9.14							
03-04-95	205	1000	22.3	7.23	8.97							
03-05-95	206	1015	22.5	7.00	9.07							
03-06-95	207	900	22.6	7.16	9.06							
03-07-95	208	900	23.3	7.17	8.72							

03-08-95	209	900	23.2	7.27	8.69							
03-09-95	210	1000	23.1	7.24	8.54	40.8	85.5	237	0.00	0.00	0.015	0.00013
03-10-95	211	900	24.3	7.07	8.41							
03-11-95	212	1100	23.6	7.13	8.68							
03-12-95	213	1800	24.7	7.14	8.43							
03-13-95	214	900	23.6	7.20	8.44							
03-14-95	215	900	23.8	7.23	8.72							
03-15-95	216	900	23.8	7.16	8.54							
03-16-95	217	900	24.2	7.15	8.80	47.6	85.5	211	0.00	0.00	0.011	0.00008
03-17-95	218	900	24.5	7.17	8.66							
03-18-95	219	1000	24.1	7.23	8.43							
03-19-95	220	1600	25.2	7.21	8.36							
03-20-95	221	900	24.5	7.17	8.38							
03-21-95	222	900	24.7	7.16	7.96							
03-22-95	223	900	24.7	7.17	8.26							
03-23-95	224	1100	24.8	7.14	7.97	47.6	85.5	231	0.00	0.00	a	a
03-24-95	225	900	24.7	7.07	7.30							
03-25-95	226	915	24.9	7.04	7.73							
03-26-95	227	900	24.8	7.00	8.59							
03-27-95	228	900	25.0	7.12	7.90							
03-28-95	229	900	24.5	7.15	7.29							
03-29-95	230	900	24.3	7.19	7.10							
03-30-95	231	900	24.5	7.15	7.16	47.6	85.5	218	0.00	0.00	0.069	0.00044
03-31-95	232	900	24.6	7.16	7.15							
04-01-95	233	900	24.1	7.00	7.74							
04-02-95	234	1000	24.2	7.01	8.34							
04-03-95	235	900	23.8	7.21	8.19							
04-04-95	236	900	24.5	7.25	7.65							
04-05-95	237	900	23.9	7.20	7.45							
04-06-95	238	900	24.1	7.22	7.77	40.8	85.5	226	0.00	0.00	0.055	0.00035
04-07-95	239	900	24.5	7.19	7.56							
04-08-95	240	1100	24.7	7.19	7.82							
04-09-95	241	1300	25.3	7.16	8.10							
04-10-95	242	900	24.8	7.16	7.13							
04-11-95	243	900	25.0	7.22	7.37							
04-12-95	244	900	25.3	7.18	7.29							
04-13-95	245	1100	25.3	7.22	7.13	40.8	85.5	245	0.00	0.00	0.038	0.00027
04-14-95	246	900	24.9	7.13	6.73							
04-15-95	247	1400	25.4	7.25	7.51							
04-16-95	248	1100	25.2	7.22	7.36							
04-17-95	249	900	25.0	7.29	7.26							
04-18-95	250	900	25.0	7.23	7.53							
04-19-95	251	900	25.3	7.26	7.55							
04-20-95	252	900	25.2	7.20	7.37	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.5	7.27	7.21							
04-22-95	254	1200	26.0	7.25	7.27							
04-23-95	255	2000	25.4	7.21	7.69							
04-24-95	256	900	24.6	7.31	7.14							
04-25-95	257	900	24.6	7.24	7.10							
04-26-95	258	900	24.3	7.23	7.16							
04-27-95	259	900	25.0	7.27	7.14	40.8	85.5	220	0.00	0.00	a	a
04-28-95	260	900	25.0	7.26	7.19							
04-29-95	261	1100	25.0	7.25	6.86							
04-30-95	262	1600	25.0	7.24	7.70							
05-01-95	263	900	24.8	7.22	7.72							
05-02-95	264	900	24.8	7.26	8.30							
05-03-95	265	900	24.5	7.28	7.40							
05-04-95	266	900	25.1	7.27	7.63	40.8	85.5	222	0.00	0.00	a	a
05-05-95	267	900	25.4	7.27	7.45							
05-06-95	268	830	25.2	7.18	7.26							
05-07-95	269	900	25.2	7.03	7.15							
05-08-95	270	900	25.3	7.10	7.48							
05-09-95	271	900	25.4	7.14	7.09							
05-10-95	272	900	26.0	7.16	7.06							
MEAN			24.2		8.27	53.1	84.6	232			0.042	0.00052
MINIMUM			20.3	6.96	6.73	34.0	68.4	174	0.00	0.00	0.000	0.00000
MAXIMUM			26.3	7.70	10.04	102.0	119.7	337	0.00	0.00	0.112	0.00145
Std Dev			1.21		0.703	21.44	8.73	34.4			0.0277	0.000444
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 19
TANK CONCENTRATION: 100% APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.70	9.11							
08-13-94	2	900	25.0	7.35	7.87							
08-14-94	3	900	25.2	7.57	7.95							
08-15-94	4	900	24.8	7.37	7.99							
08-16-94	5	1000	25.0	7.43	7.57							
08-17-94	6	1000	25.0	7.23	7.48							
08-18-94	7	900	25.0	7.31	7.50	40.8	85.5	202	0.00	0.00	0.135	0.00155
08-19-94	8	800	24.9	7.31	8.30							
08-20-94	9	1000	24.9	7.34	8.25							
08-21-94	10	800	25.0	7.44	8.17							
08-22-94	11	900	24.9	7.50	8.17							
08-23-94	12	730	24.7	7.40	8.25							
08-24-94	13	1000	24.7	7.37	8.41							
08-25-94	14	1100	24.7	7.40	8.67	40.8	85.5	206	0.00	0.00	0.076	0.00105
08-26-94	15	900	24.7	7.38	8.37							
08-27-94	16	900	24.8	7.39	8.29							
08-28-94	17	800	24.8	7.38	8.26							
08-29-94	18	900	25.2	7.45	8.22							
08-30-94	19	900	24.6	7.45	8.23							
08-31-94	20	800	24.8	7.49	8.30							
09-01-94	21	1100	25.0	7.47	8.89	40.8	102.6	218	0.00	0.00	a	a
09-02-94	22	900	24.7	7.47	8.82							
09-03-94	23	815	24.4	7.36	8.16							
09-04-94	24	810	24.4	7.38	8.33							
09-05-94	25	1100	24.5	7.38	8.97							
09-06-94	26	900	24.3	7.37	8.98							
09-07-94	27	800	24.3	7.39	8.98							
09-08-94	28	1100	24.2	7.37	9.21	40.8	85.5	213	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.3	7.31	9.77							
09-10-94	30	900	24.4	7.49	9.22							
09-11-94	31	800	23.9	7.37	8.84							
09-12-94	32	500	24.1	7.42	8.40							

09-13-94	33	700	24.2	7.35	9.12							
09-14-94	34	1400	24.8	7.43	8.73							
09-15-94	35	1300	24.8	7.37	8.48							
09-16-94	36	1200	24.8	7.36	8.53	40.8	85.5	210	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.8	7.30	8.23							
09-18-94	38	830	24.9	7.25	8.27							
09-19-94	39	1000	24.6	7.30	8.62							
09-20-94	40	1000	24.6	7.36	8.80							
09-21-94	41	1000	24.8	7.33	8.76							
09-22-94	42	900	24.9	7.30	8.50	40.8	85.5	215	0.00	0.00	a	a
09-23-94	43	1000	24.9	7.36	9.05							
09-24-94	44	845	24.7	7.21	8.27							
09-25-94	45	1300	24.9	a	8.70							
09-26-94	46	900	24.8	7.18	8.32							
09-27-94	47	800	24.8	7.17	8.83							
09-28-94	48	1000	24.7	7.00	8.17	34.0	68.4	181	a	a	a	a
09-29-94	49	1030	24.8	7.14	7.80							
09-30-94	50	1030	24.4	7.28	8.56							
10-01-94	51	900	24.3	7.19	7.79							
10-02-94	52	915	24.5	7.24	8.87							
10-03-94	53	1100	24.1	7.23	9.10							
10-04-94	54	1100	24.0	7.22	8.91							
10-05-94	55	1000	24.4	7.20	9.12							
10-06-94	56	800	24.0	7.20	8.47	40.8	85.5	202	0.00	0.00	a	a
10-07-94	57	1100	24.3	7.18	9.17						0.025	0.00020
10-08-94	58	1100	24.5	7.13	9.41							
10-09-94	59	1100	24.7	7.16	8.78							
10-10-94	60	1000	24.3	7.16	8.49							
10-11-94	61	1600	24.5	7.19	8.20							
10-12-94	62	900	23.8	7.18	8.86							
10-13-94	63	1300	24.6	7.14	8.47	40.8	85.5	207	0.00	0.00	a	a
10-14-94	64	1300	25.9	7.06	7.45							
10-15-94	65	900	25.3	7.16	7.88							
10-16-94	66	900	24.8	7.20	8.13							
10-17-94	67	1000	24.8	7.16	8.55							
10-18-94	68	800	24.7	7.00	7.87							
10-19-94	69	900	24.9	7.24	8.26							
10-20-94	70	900	24.4	7.13	8.11	40.8	85.5	207	0.00	0.00	0.027	0.00020
10-21-94	71	900	22.6	7.18	9.29							
10-22-94	72	800	24.2	7.23	8.56							
10-23-94	73	900	24.6	7.22	8.91							
10-24-94	74	900	24.4	7.22	8.43							
10-25-94	75	900	24.6	7.20	8.31							
10-26-94	76	800	24.4	7.22	8.50							

10-27-94	77	1100	24.9	7.23	8.74	40.8	85.5	200	0.00	0.00	0.020	0.00019
10-28-94	78	1000	24.7	7.28	8.79							
10-29-94	79	900	24.6	7.23	8.05							
10-30-94	80	900	24.9	7.24	8.87							
10-31-94	81	1000	24.9	7.20	9.29							
11-01-94	82	1100	25.3	7.17	9.08							
11-02-94	83	1000	24.9	7.23	9.10							
11-03-94	84	1000	24.8	7.13	8.04							
11-04-94	85	1000	25.0	7.11	8.20	40.8	85.5	212	0.00	0.00	0.055	0.00040
11-05-94	86	1000	25.0	7.30	9.26							
11-06-94	87	1000	25.2	7.16	8.98							
11-07-94	88	700	24.8	7.19	9.27							
11-08-94	89	1000	24.7	7.15	9.28							
11-09-94	90	1000	24.8	7.15	9.18							
11-10-94	91	1100	24.8	7.14	8.06							
11-11-94	92	900	24.4	7.14	8.30	40.8	85.5	215	0.00	0.00	0.061	0.00046
11-12-94	93	845	24.2	7.14	7.98							
11-13-94	94	830	24.3	7.16	8.50							
11-14-94	95	1000	24.4	7.12	8.79							
11-15-94	96	900	24.8	7.12	8.83							
11-16-94	97	900	24.7	7.18	8.29	40.8	85.5	198	0.00	0.00	0.040	0.00033
11-17-94	98	900	24.8	7.20	8.44							
11-18-94	99	900	25.0	7.15	8.23							
11-19-94	100	800	24.8	7.20	8.22							
11-20-94	101	900	24.7	7.18	8.49							
11-21-94	102	600	24.5	7.23	8.62							
11-22-94	103	600	24.8	7.23	8.40							
11-23-94	104	800	22.3	7.44	9.02	54.4	85.5	195	0.00	0.00	0.050	0.00064
11-24-94	105	730	22.8	7.11	8.24							
11-25-94	106	1020	22.4	7.12	9.61							
11-26-94	107	1000	22.6	7.17	8.85							
11-27-94	108	900	21.9	7.17	9.11							
11-28-94	109	900	22.7	7.16	9.08							
11-29-94	110	900	22.0	7.02	9.15							
11-30-94	111	900	22.1	6.98	8.98							
12-01-94	112	900	21.6	7.02	8.96	34.0	85.5	174	0.00	0.00	0.051	0.00024
12-02-94	113	1000	26.1	7.09	8.63							
12-03-94	114	1000	24.6	6.95	8.10							
12-04-94	115	1100	24.9	7.05	8.39							
12-05-94	116	900	25.1	7.12	8.06							
12-06-94	117	900	25.1	7.51	8.13							
12-07-94	118	800	25.0	7.53	8.95							
12-08-94	119	1100	25.1	7.57	7.90	88.4	68.4	266	0.00	0.00	0.041	0.00085
12-09-94	120	1000	24.9	7.60	7.83							

12-10-94	121	1300	25.2	7.57	7.59							
12-11-94	122	900	25.2	7.60	7.91							
12-12-94	123	900	24.2	7.55	8.51							
12-13-94	124	900	24.0	7.62	8.74							
12-14-94	125	900	23.9	7.60	8.76							
12-15-94	126	800	24.8	7.58	8.46	81.6	68.4	259	0.00	0.00	0.076	0.00159
12-16-94	127	1100	24.7	7.55	8.12							
12-17-94	128	845	24.9	7.47	7.70							
12-18-94	129	930	24.9	7.46	7.53							
12-19-94	130	1000	25.0	7.55	7.81							
12-20-94	131	1100	24.8	7.54	8.16							
12-21-94	132	1000	24.7	7.43	8.08	81.6	68.4	254	0.00	0.00	0.089	0.00132
12-22-94	133	800	24.6	7.64	7.94							
12-23-94	134	1000	24.6	7.57	7.90							
12-24-94	135	900	24.8	7.68	8.00							
12-25-94	136	700	23.6	7.66	8.57							
12-26-94	137	1000	23.7	7.61	8.43							
12-27-94	138	1100	24.3	7.71	8.21							
12-28-94	139	1000	24.4	7.61	8.65							
12-29-94	140	900	24.4	7.63	7.91	95.2	85.5	274	0.00	0.00	0.053	0.00120
12-30-94	141	1000	24.3	7.56	7.94							
12-31-94	142	1000	24.3	7.44	7.95							
01-01-95	143	1100	24.6	7.60	7.92							
01-02-95	144	1000	24.7	7.64	7.89							
01-03-95	145	1100	24.4	7.53	8.44							
01-04-95	146	900	24.4	7.62	8.00							
01-05-95	147	1100	23.9	7.62	8.99	95.2	68.4	278	0.00	0.00	0.047	0.00101
01-06-95	148	1000	22.8	7.51	8.84							
01-07-95	149	1130	23.5	7.48	9.43							
01-08-95	150	1030	23.3	7.66	9.09							
01-09-95	151	1000	23.2	7.61	9.59							
01-10-95	152	1000	23.9	7.68	8.20							
01-11-95	153	1000	24.0	7.58	7.60							
01-12-95	154	1100	24.3	7.64	7.52	102.0	85.5	289	0.00	0.00	0.034	0.00078
01-13-95	155	1000	24.2	7.60	7.72							
01-14-95	156	900	24.5	7.57	7.71							
01-15-95	157	800	25.1	7.56	7.77							
01-16-95	158	1030	24.8	7.54	7.84							
01-17-95	159	1000	24.5	7.58	8.15							
01-18-95	160	1000	24.5	7.62	7.33							
01-19-95	161	1000	24.7	7.61	7.49	88.4	102.6	277	0.00	0.00	a	a
01-20-95	162	1000	24.8	7.65	7.40							
01-21-95	163	1000	24.8	7.58	7.02							
01-22-95	164	1100	24.6	7.61	7.04							

01-23-95	165	600	24.5	7.69	7.63							
01-24-95	166	1000	24.5	7.64	8.15							
01-25-95	167	1100	22.5	7.70	7.49							
01-26-95	168	1100	23.0	7.58	7.38	95.2	85.5	285	0.00	0.00	0.020	0.00043
01-27-95	169	1000	23.0	7.55	7.41							
01-28-95	170	830	23.8	7.55	7.29							
01-29-95	171	900	23.4	7.59	7.93							
01-30-95	172	1000	23.8	7.43	7.64							
01-31-95	173	1000	22.4	7.50	8.01							
02-01-95	174	1000	24.9	7.55	7.37							
02-02-95	175	900	25.1	7.58	7.76	88.4	85.5	277	0.00	0.00	0.036	0.00077
02-03-95	176	930	24.8	7.52	7.70							
02-04-95	177	1000	24.9	7.50	7.99							
02-05-95	178	1200	24.0	7.35	8.10							
02-06-95	179	930	21.2	7.52	8.79							
02-07-95	180	900	22.6	7.52	8.41							
02-08-95	181	900	22.5	7.33	8.20							
02-09-95	182	900	20.9	7.36	9.02	47.6	119.7	242	0.00	0.00	0.014	0.00013
02-10-95	183	900	21.7	7.20	8.51							
02-11-95	184	900	20.8	7.13	9.44							
02-12-95	185	1200	20.7	7.06	9.73							
02-13-95	186	900	19.8	7.19	9.81							
02-14-95	187	900	19.7	7.15	9.53							
02-15-95	188	900	20.3	7.10	9.55							
02-16-95	189	900	20.5	7.10	9.63	34.0	85.5	236	0.00	0.00	0.030	0.00015
02-17-95	190	900	19.9	7.09	9.60							
02-18-95	191	1100	19.8	7.09	10.15							
02-19-95	192	1400	20.7	7.01	9.93							
02-20-95	193	1000	20.2	7.07	9.57							
02-21-95	194	1000	20.5	7.20	9.51							
02-22-95	195	900	20.2	7.24	9.40							
02-23-95	196	1000	21.3	7.23	9.45	34.0	85.5	235	0.00	0.00	0.038	0.00030
02-24-95	197	1000	20.8	7.23	9.18							
02-25-95	198	1000	20.3	7.20	9.37							
02-26-95	199	1800	20.8	7.34	9.66							
02-27-95	200	900	20.7	7.18	9.27							
02-28-95	201	900	21.5	7.19	9.13							
03-01-95	202	900	21.5	7.11	9.01							
03-02-95	203	900	21.1	7.18	9.28	34.0	85.5	337	0.00	0.00	0.012	0.00008
03-03-95	204	900	20.7	7.23	9.09							
03-04-95	205	1000	21.9	7.23	8.45							
03-05-95	206	1015	22.1	7.01	9.02							
03-06-95	207	900	22.2	7.16	9.06							
03-07-95	208	900	22.8	7.17	8.63							

03-08-95	209	900	22.7	7.27	8.57							
03-09-95	210	1000	23.4	7.24	8.20	40.8	85.5	237	0.00	0.00	0.015	0.00013
03-10-95	211	900	24.9	7.07	8.07							
03-11-95	212	1100	24.0	7.13	8.59							
03-12-95	213	1800	24.8	7.14	8.37							
03-13-95	214	900	24.0	7.20	8.30							
03-14-95	215	900	24.2	7.23	8.61							
03-15-95	216	900	24.1	7.16	8.43							
03-16-95	217	900	24.7	7.15	8.64	47.6	85.5	212	0.00	0.00	0.011	0.00008
03-17-95	218	900	24.9	7.17	8.43							
03-18-95	219	1000	24.5	7.23	8.20							
03-19-95	220	1600	25.5	7.21	8.25							
03-20-95	221	900	24.6	7.17	8.18							
03-21-95	222	900	25.1	7.16	7.75							
03-22-95	223	900	25.1	7.17	8.07							
03-23-95	224	1100	24.8	7.14	7.93	47.6	85.5	232	0.00	0.00	a	a
03-24-95	225	900	24.9	7.07	6.76							
03-25-95	226	915	25.1	7.06	7.71							
03-26-95	227	900	25.0	7.01	8.48							
03-27-95	228	900	25.3	7.12	7.71							
03-28-95	229	900	24.7	7.15	7.33							
03-29-95	230	900	24.5	7.19	7.25							
03-30-95	231	900	24.6	7.15	7.04	47.6	85.5	217	0.00	0.00	0.069	0.00044
03-31-95	232	900	24.8	7.16	6.92							
04-01-95	233	900	24.2	7.01	7.70							
04-02-95	234	1000	24.4	7.00	8.16							
04-03-95	235	900	24.1	7.21	7.89							
04-04-95	236	900	24.8	7.25	7.38							
04-05-95	237	900	24.2	7.20	7.12							
04-06-95	238	900	24.4	7.22	7.42	40.8	85.5	225	0.00	0.00	0.056	0.00036
04-07-95	239	900	24.7	7.19	7.33							
04-08-95	240	1100	24.8	7.19	7.65							
04-09-95	241	1300	25.2	7.16	7.96							
04-10-95	242	900	24.9	7.16	6.79							
04-11-95	243	900	25.0	7.22	6.97							
04-12-95	244	900	25.3	7.18	6.88							
04-13-95	245	1100	25.1	7.22	7.00	40.8	85.5	244	0.00	0.00	0.039	0.00027
04-14-95	246	900	25.0	7.13	6.51							
04-15-95	247	1400	25.2	7.25	7.47							
04-16-95	248	1100	25.2	7.22	7.30							
04-17-95	249	900	25.2	7.29	7.04							
04-18-95	250	900	25.0	7.23	7.27							
04-19-95	251	900	25.3	7.26	7.27							
04-20-95	252	900	25.2	7.20	7.09	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.4	7.27	6.88							
04-22-95	254	1200	25.9	7.25	7.28							
04-23-95	255	2000	25.4	7.21	7.53							
04-24-95	256	900	24.6	7.31	7.13							
04-25-95	257	900	24.6	7.24	6.95							
04-26-95	258	900	24.3	7.23	6.87							
04-27-95	259	900	24.9	7.27	6.95	40.8	85.5	219	0.00	0.00	a	a
04-28-95	260	900	25.0	7.26	6.89							
04-29-95	261	1100	25.0	7.25	6.78							
04-30-95	262	1600	25.0	7.24	7.60							
05-01-95	263	900	24.9	7.22	7.79							
05-02-95	264	900	24.8	7.26	8.48							
05-03-95	265	900	24.6	7.28	7.33							
05-04-95	266	900	25.1	7.27	7.53	40.8	85.5	221	0.00	0.00	a	a
05-05-95	267	900	25.5	7.27	7.32							
05-06-95	268	830	25.6	7.17	7.04							
05-07-95	269	900	25.5	7.02	7.08							
05-08-95	270	900	25.4	7.10	7.28							
05-09-95	271	900	25.4	7.14	7.11							
05-10-95	272	900	26.1	7.16	7.17							
MEAN			24.1		8.27	52.8	84.6	231			0.042	0.00052
MINIMUM			19.7	6.95	6.51	34.0	68.4	174	0.00	0.00	0.000	0.00000
MAXIMUM			26.1	7.71	10.15	102.0	119.7	337	0.00	0.00	0.135	0.00159
Std Dev			1.33		0.736	21.70	9.57	34.1			0.0285	0.000457
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 20
TANK CONCENTRATION: 100% APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.67	9.09							
08-13-94	2	900	25.1	7.35	7.99							
08-14-94	3	900	25.2	7.57	7.99							
08-15-94	4	900	24.8	7.37	8.29							
08-16-94	5	1000	25.1	7.43	7.87							
08-17-94	6	1000	25.0	7.23	7.56							
08-18-94	7	900	25.1	7.31	7.52	40.8	85.5	202	0.00	0.00	0.075	0.00087
08-19-94	8	800	24.9	7.31	8.28							
08-20-94	9	1000	24.9	7.34	8.21							
08-21-94	10	800	25.0	7.44	8.12							
08-22-94	11	900	25.0	7.50	8.15							
08-23-94	12	730	24.7	7.40	8.23							
08-24-94	13	1000	24.7	7.37	8.37							
08-25-94	14	1100	24.7	7.40	8.62	40.8	85.5	206	0.00	0.00	0.057	0.00079
08-26-94	15	900	24.8	7.38	8.32							
08-27-94	16	900	24.8	7.39	8.29							
08-28-94	17	800	24.8	7.38	8.25							
08-29-94	18	900	25.2	7.45	8.18							
08-30-94	19	900	24.7	7.45	8.22							
08-31-94	20	800	24.8	7.49	8.28							
09-01-94	21	1100	25.0	7.47	8.92	40.8	85.5	218	0.00	0.00	a	a
09-02-94	22	900	24.7	7.47	8.79							
09-03-94	23	815	24.4	7.38	8.04							
09-04-94	24	810	24.4	7.44	8.42							
09-05-94	25	1100	24.5	7.38	8.96							
09-06-94	26	900	24.3	7.37	8.91							
09-07-94	27	800	24.4	7.39	8.93							
09-08-94	28	1100	24.2	7.37	9.19	40.8	85.5	213	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.3	7.31	9.78							
09-10-94	30	900	24.4	7.49	9.18							
09-11-94	31	800	24.0	7.37	8.79							
09-12-94	32	500	24.2	7.42	8.36							

09-13-94	33	700	24.3	7.35	9.05							
09-14-94	34	1400	24.8	7.44	8.69							
09-15-94	35	1300	24.8	7.37	8.37							
09-16-94	36	1200	24.9	7.34	8.47	40.8	85.5	210	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.8	7.29	8.42							
09-18-94	38	830	24.9	7.28	8.34							
09-19-94	39	1000	24.7	7.28	8.60							
09-20-94	40	1000	24.7	7.35	8.75							
09-21-94	41	1000	24.9	7.33	8.66							
09-22-94	42	900	25.0	7.30	8.46	40.8	85.5	215	0.00	0.00	a	a
09-23-94	43	1000	24.9	7.36	8.93							
09-24-94	44	845	24.6	7.29	8.39							
09-25-94	45	1300	25.0	a	8.57							
09-26-94	46	900	24.9	7.18	8.26							
09-27-94	47	800	24.9	7.17	8.76							
09-28-94	48	1000	24.8	7.00	8.06	34.0	68.4	181	a	a	a	a
09-29-94	49	1030	24.8	7.17	7.83							
09-30-94	50	1030	24.4	7.28	8.67							
10-01-94	51	900	24.2	7.21	7.86							
10-02-94	52	915	24.4	7.26	8.93							
10-03-94	53	1100	24.2	7.23	9.10							
10-04-94	54	1100	24.1	7.22	8.88							
10-05-94	55	1000	24.5	7.20	9.06							
10-06-94	56	800	24.1	7.20	8.41	40.8	85.5	202	0.00	0.00	a	a
10-07-94	57	1100	24.5	7.18	9.06						0.030	0.00025
10-08-94	58	1100	24.6	7.13	9.30							
10-09-94	59	1100	24.8	7.16	8.66							
10-10-94	60	1000	24.3	7.16	8.39							
10-11-94	61	1600	24.7	7.19	8.09							
10-12-94	62	900	24.0	7.18	8.77							
10-13-94	63	1300	24.8	7.14	8.37	40.8	85.5	207	0.00	0.00	a	a
10-14-94	64	1300	26.1	7.06	7.31							
10-15-94	65	900	25.4	7.16	7.77							
10-16-94	66	900	24.9	7.20	8.02							
10-17-94	67	1000	24.9	7.16	8.44							
10-18-94	68	800	24.8	7.00	7.81							
10-19-94	69	900	25.0	7.24	8.21							
10-20-94	70	900	24.5	7.13	8.04	40.8	85.5	207	0.00	0.00	0.027	0.00020
10-21-94	71	900	22.7	7.18	9.25							
10-22-94	72	800	24.2	7.23	8.50							
10-23-94	73	900	24.7	7.22	8.85							
10-24-94	74	900	24.5	7.22	8.38							
10-25-94	75	900	24.6	7.20	8.21							
10-26-94	76	800	24.4	7.22	8.38							

10-27-94	77	1100	25.1	7.23	8.58	40.8	85.5	200	0.00	0.00	0.022	0.00021
10-28-94	78	1000	24.8	7.28	8.66							
10-29-94	79	900	24.8	7.23	7.94							
10-30-94	80	900	25.0	7.24	8.72							
10-31-94	81	1000	25.1	7.20	9.14							
11-01-94	82	1100	25.4	7.17	8.87							
11-02-94	83	1000	25.0	7.23	8.87							
11-03-94	84	1000	24.9	7.13	7.90							
11-04-94	85	1000	25.1	7.11	8.03	40.8	85.5	212	0.00	0.00	0.066	0.00048
11-05-94	86	1000	25.1	7.30	9.03							
11-06-94	87	1000	25.4	7.16	8.75							
11-07-94	88	700	25.0	7.19	9.05							
11-08-94	89	1000	24.9	7.15	9.04							
11-09-94	90	1000	25.0	7.15	8.96							
11-10-94	91	1100	25.0	7.14	7.92							
11-11-94	92	900	24.6	7.14	8.25	40.8	85.5	215	0.00	0.00	0.069	0.00052
11-12-94	93	845	24.2	7.14	7.95							
11-13-94	94	830	24.4	7.15	8.48							
11-14-94	95	1000	24.5	7.12	8.64							
11-15-94	96	900	24.8	7.12	8.71							
11-16-94	97	900	24.8	7.18	8.17	40.8	85.5	198	0.00	0.00	0.044	0.00037
11-17-94	98	900	24.9	7.20	8.37							
11-18-94	99	900	25.0	7.15	8.19							
11-19-94	100	800	25.0	7.20	8.20							
11-20-94	101	900	24.8	7.18	8.47							
11-21-94	102	600	24.7	7.23	8.53							
11-22-94	103	600	25.0	7.23	8.31							
11-23-94	104	800	22.4	7.44	8.95	54.4	85.5	195	0.00	0.00	0.047	0.00060
11-24-94	105	730	22.9	7.12	8.26							
11-25-94	106	1020	22.5	7.13	9.67							
11-26-94	107	1000	22.7	7.17	8.77							
11-27-94	108	900	22.0	7.17	9.00							
11-28-94	109	900	22.8	7.16	9.00							
11-29-94	110	900	22.1	7.02	9.09							
11-30-94	111	900	22.1	6.98	8.91							
12-01-94	112	900	21.7	7.02	8.82	34.0	85.5	174	0.00	0.00	0.055	0.00026
12-02-94	113	1000	26.2	7.08	8.55							
12-03-94	114	1000	24.7	6.99	8.06							
12-04-94	115	1100	25.0	7.05	8.30							
12-05-94	116	900	25.1	7.12	7.93							
12-06-94	117	900	25.1	7.51	8.03							
12-07-94	118	800	25.1	7.53	8.80							
12-08-94	119	1100	25.2	7.57	7.87	88.4	68.4	266	0.00	0.00	0.038	0.00080
12-09-94	120	1000	24.9	7.60	7.73							

12-10-94	121	1300	25.2	7.57	7.57							
12-11-94	122	900	25.3	7.60	7.76							
12-12-94	123	900	24.3	7.55	8.37							
12-13-94	124	900	24.1	7.62	8.53							
12-14-94	125	900	23.9	7.60	8.59							
12-15-94	126	800	24.9	7.58	8.37	81.6	68.4	260	0.00	0.00	0.079	0.00166
12-16-94	127	1100	24.6	7.55	8.04							
12-17-94	128	845	25.0	7.51	7.65							
12-18-94	129	930	25.0	7.42	7.51							
12-19-94	130	1000	25.1	7.55	7.65							
12-20-94	131	1100	25.0	7.54	8.00							
12-21-94	132	1000	24.7	7.43	7.91	81.6	68.4	254	0.00	0.00	0.100	0.00148
12-22-94	133	800	24.7	7.64	7.71							
12-23-94	134	1000	24.7	7.57	7.85							
12-24-94	135	900	24.9	7.68	7.89							
12-25-94	136	700	23.6	7.71	8.48							
12-26-94	137	1000	23.8	7.58	8.34							
12-27-94	138	1100	24.4	7.71	8.16							
12-28-94	139	1000	24.5	7.61	8.61							
12-29-94	140	900	24.5	7.63	7.80	95.2	85.5	275	0.00	0.00	0.052	0.00119
12-30-94	141	1000	24.3	7.56	7.78							
12-31-94	142	1000	24.4	7.44	7.80							
01-01-95	143	1100	24.7	7.60	7.76							
01-02-95	144	1000	24.7	7.64	7.73							
01-03-95	145	1100	24.4	7.53	8.37							
01-04-95	146	900	24.4	7.62	7.81							
01-05-95	147	1100	23.9	7.62	8.94	95.2	68.4	278	0.00	0.00	0.030	0.00064
01-06-95	148	1000	23.0	7.49	8.77							
01-07-95	149	1130	23.5	7.49	9.42							
01-08-95	150	1030	23.4	7.68	9.11							
01-09-95	151	1000	23.1	7.61	9.81							
01-10-95	152	1000	23.9	7.68	8.22							
01-11-95	153	1000	24.1	7.58	7.61							
01-12-95	154	1100	24.1	7.64	7.64	102.0	85.5	290	0.00	0.00	0.032	0.00073
01-13-95	155	1000	24.1	7.60	7.87							
01-14-95	156	900	24.6	7.57	7.80							
01-15-95	157	800	25.1	7.56	7.79							
01-16-95	158	1030	24.9	7.54	7.95							
01-17-95	159	1000	24.5	7.58	8.33							
01-18-95	160	1000	24.5	7.62	7.52							
01-19-95	161	1000	24.6	7.61	7.51	88.4	102.6	277	0.00	0.00	a	a
01-20-95	162	1000	24.8	7.65	7.40							
01-21-95	163	1000	24.9	7.58	7.23							
01-22-95	164	1100	24.7	7.61	7.24							

01-23-95	165	600	24.5	7.69	7.75							
01-24-95	166	1000	24.6	7.64	8.47							
01-25-95	167	1100	22.5	7.70	7.61							
01-26-95	168	1100	23.1	7.58	7.74	95.2	85.5	282	0.00	0.00	0.013	0.00024
01-27-95	169	1000	23.1	7.55	7.61							
01-28-95	170	830	23.9	7.55	7.36							
01-29-95	171	900	23.6	7.59	8.01							
01-30-95	172	1000	23.9	7.43	7.81							
01-31-95	173	1000	22.6	7.50	8.29							
02-01-95	174	1000	25.0	7.55	7.52							
02-02-95	175	900	25.1	7.58	7.90	88.4	85.5	279	0.00	0.00	0.034	0.00073
02-03-95	176	930	24.9	7.52	7.92							
02-04-95	177	1000	25.0	7.50	8.02							
02-05-95	178	1200	24.2	7.35	8.12							
02-06-95	179	930	21.4	7.52	8.77							
02-07-95	180	900	22.7	7.52	8.38							
02-08-95	181	900	22.7	7.33	8.19							
02-09-95	182	900	21.2	7.36	9.15	47.6	119.7	243	0.00	0.00	0.014	0.00014
02-10-95	183	900	22.0	7.20	8.51							
02-11-95	184	900	21.0	7.13	9.28							
02-12-95	185	1200	20.8	7.06	9.57							
02-13-95	186	900	20.1	7.19	9.80							
02-14-95	187	900	20.0	7.15	9.52							
02-15-95	188	900	20.7	7.10	9.53							
02-16-95	189	900	20.8	7.10	9.57	34.0	85.5	238	0.00	0.00	0.029	0.00015
02-17-95	190	900	20.3	7.09	9.58							
02-18-95	191	1100	20.1	7.09	9.95							
02-19-95	192	1400	21.0	7.01	9.81							
02-20-95	193	1000	20.6	7.07	9.59							
02-21-95	194	1000	20.7	7.20	9.52							
02-22-95	195	900	20.6	7.24	9.44							
02-23-95	196	1000	21.6	7.23	9.39	34.0	85.5	237	0.00	0.00	0.041	0.00030
02-24-95	197	1000	21.2	7.23	9.19							
02-25-95	198	1000	20.6	7.20	9.37							
02-26-95	199	1800	21.1	7.34	9.57							
02-27-95	200	900	21.0	7.18	9.31							
02-28-95	201	900	21.9	7.19	9.19							
03-01-95	202	900	21.9	7.11	9.14							
03-02-95	203	900	21.4	7.18	9.14	34.0	85.5	339	0.00	0.00	0.012	0.00008
03-03-95	204	900	21.0	7.23	9.09							
03-04-95	205	1000	22.1	7.23	9.03							
03-05-95	206	1015	22.3	7.03	9.12							
03-06-95	207	900	22.4	7.16	9.08							
03-07-95	208	900	23.1	7.17	8.78							

03-08-95	209	900	23.0	7.27	8.72							
03-09-95	210	1000	23.2	7.24	8.41	40.8	85.5	237	0.00	0.00	0.015	0.00013
03-10-95	211	900	24.7	7.07	8.14							
03-11-95	212	1100	23.7	7.13	8.64							
03-12-95	213	1800	24.8	7.14	8.24							
03-13-95	214	900	23.9	7.20	8.27							
03-14-95	215	900	24.0	7.23	8.55							
03-15-95	216	900	24.0	7.16	8.42							
03-16-95	217	900	24.5	7.15	8.63	47.6	85.5	212	0.00	0.00	0.012	0.00008
03-17-95	218	900	24.7	7.17	8.33							
03-18-95	219	1000	24.3	7.23	8.12							
03-19-95	220	1600	25.5	7.21	8.19							
03-20-95	221	900	24.7	7.17	8.07							
03-21-95	222	900	24.9	7.16	7.61							
03-22-95	223	900	25.0	7.17	7.92							
03-23-95	224	1100	24.8	7.14	7.28	47.6	85.5	232	0.00	0.00	a	a
03-24-95	225	900	24.7	7.07	6.78							
03-25-95	226	915	25.0	7.05	7.81							
03-26-95	227	900	25.1	6.95	8.55							
03-27-95	228	900	25.0	7.12	7.68							
03-28-95	229	900	24.8	7.15	7.16							
03-29-95	230	900	24.7	7.19	7.13							
03-30-95	231	900	24.8	7.15	7.05	47.6	85.5	218	0.00	0.00	0.064	0.00041
03-31-95	232	900	24.9	7.16	6.81							
04-01-95	233	900	24.4	7.04	7.85							
04-02-95	234	1000	24.3	7.02	8.10							
04-03-95	235	900	24.1	7.21	7.82							
04-04-95	236	900	24.7	7.25	7.30							
04-05-95	237	900	24.2	7.20	7.08							
04-06-95	238	900	24.4	7.22	7.30	40.8	85.5	226	0.00	0.00	0.058	0.00037
04-07-95	239	900	24.7	7.19	7.20							
04-08-95	240	1100	24.9	7.19	7.49							
04-09-95	241	1300	25.3	7.16	7.88							
04-10-95	242	900	25.0	7.16	6.38							
04-11-95	243	900	25.1	7.22	6.78							
04-12-95	244	900	25.3	7.18	6.88							
04-13-95	245	1100	25.4	7.22	6.92	40.8	85.5	244	0.00	0.00	0.039	0.00027
04-14-95	246	900	25.1	7.13	6.50							
04-15-95	247	1400	25.4	7.25	7.33							
04-16-95	248	1100	25.3	7.22	7.15							
04-17-95	249	900	25.3	7.29	6.94							
04-18-95	250	900	25.1	7.23	7.25							
04-19-95	251	900	25.4	7.26	7.36							
04-20-95	252	900	25.4	7.20	7.23	40.8	68.4	218	0.00	0.00	a	a

04-21-95	253	900	25.8	7.27	6.78							
04-22-95	254	1200	26.2	7.25	6.96							
04-23-95	255	2000	25.7	7.21	7.34							
04-24-95	256	900	24.9	7.31	6.90							
04-25-95	257	900	24.9	7.24	6.72							
04-26-95	258	900	24.7	7.23	6.70							
04-27-95	259	900	25.1	7.27	6.62	40.8	85.5	221	0.00	0.00	a	a
04-28-95	260	900	25.3	7.26	6.52							
04-29-95	261	1100	25.3	7.25	6.45							
04-30-95	262	1600	25.4	7.24	7.31							
05-01-95	263	900	25.3	7.22	7.37							
05-02-95	264	900	25.2	7.26	7.91							
05-03-95	265	900	25.0	7.28	6.93							
05-04-95	266	900	25.9	7.27	7.05	40.8	85.5	224	0.00	0.00	a	a
05-05-95	267	900	26.1	7.27	7.02							
05-06-95	268	830	26.0	7.18	6.98							
05-07-95	269	900	26.2	7.00	6.65							
05-08-95	270	900	26.0	7.10	6.80							
05-09-95	271	900	26.0	7.14	6.64							
05-10-95	272	900	26.7	7.16	6.50							
MEAN			24.3		8.21	52.8	84.2	232			0.040	0.00048
MINIMUM			20.0	6.95	6.38	34.0	68.4	174	0.00	0.00	0.000	0.00000
MAXIMUM			26.7	7.71	9.95	102.0	119.7	339	0.00	0.00	0.100	0.00166
Std Dev			1.30		0.762	21.70	9.10	34.2			0.0244	0.000413
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 21
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.57	9.03							
08-13-94	2	900	25.1	7.29	7.56							
08-14-94	3	900	25.2	7.43	7.64							
08-15-94	4	900	24.9	7.36	8.16							
08-16-94	5	1000	25.0	7.37	7.54							
08-17-94	6	1000	25.0	7.27	7.45							
08-18-94	7	900	25.0	7.28	7.33	40.8	85.5	205	0.00	0.00	0.057	0.00061
08-19-94	8	800	24.8	7.25	8.21							
08-20-94	9	1000	24.9	7.30	8.19							
08-21-94	10	800	25.0	7.38	8.10							
08-22-94	11	900	24.9	7.46	8.17							
08-23-94	12	730	24.6	7.35	8.16							
08-24-94	13	1000	24.6	7.31	8.35							
08-25-94	14	1100	24.6	7.35	8.65	40.8	85.5	209	0.00	0.00	0.059	0.00072
08-26-94	15	900	24.7	7.36	8.28							
08-27-94	16	900	24.7	7.35	8.24							
08-28-94	17	800	24.7	7.36	8.17							
08-29-94	18	900	25.1	7.40	8.14							
08-30-94	19	900	24.5	7.42	8.25							
08-31-94	20	800	24.7	7.47	8.30							
09-01-94	21	1100	24.9	7.44	8.85	40.8	85.5	220	0.00	0.00	a	a
09-02-94	22	900	24.6	7.47	8.74							
09-03-94	23	815	24.3	7.36	8.10							
09-04-94	24	810	24.2	7.47	8.20							
09-05-94	25	1100	24.3	7.42	8.96							
09-06-94	26	900	24.1	7.42	8.93							
09-07-94	27	800	24.1	7.46	8.96							
09-08-94	28	1100	24.0	7.50	9.17	40.8	85.5	214	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.1	7.37	9.77							
09-10-94	30	900	24.2	7.52	9.16							
09-11-94	31	800	23.8	7.43	8.79							
09-12-94	32	500	23.9	7.50	8.34							

09-13-94	33	700	24.0	7.42	9.11							
09-14-94	34	1400	24.6	7.47	8.66							
09-15-94	35	1300	24.6	7.39	8.40							
09-16-94	36	1200	24.7	7.43	8.53	40.8	85.5	212	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.34	8.25							
09-18-94	38	830	24.8	7.34	8.62							
09-19-94	39	1000	24.4	7.41	8.63							
09-20-94	40	1000	24.4	7.46	8.77							
09-21-94	41	1000	24.6	7.43	8.70							
09-22-94	42	900	24.8	7.45	8.42	40.8	85.5	216	0.00	0.00	a	a
09-23-94	43	1000	24.7	7.48	8.92							
09-24-94	44	845	24.5	7.29	8.46							
09-25-94	45	1300	24.8	a	8.75							
09-26-94	46	900	24.7	7.27	8.33							
09-27-94	47	800	24.8	7.26	8.78							
09-28-94	48	1000	24.6	7.10	8.14	34.0	85.5	184	a	a	a	a
09-29-94	49	1030	24.6	7.21	7.94							
09-30-94	50	1030	24.3	7.34	8.77							
10-01-94	51	900	24.1	7.29	8.08							
10-02-94	52	915	24.4	7.27	9.14							
10-03-94	53	1100	24.0	7.31	9.11							
10-04-94	54	1100	24.0	7.31	8.90							
10-05-94	55	1000	24.4	7.28	9.11							
10-06-94	56	800	24.0	7.30	8.48	40.8	68.4	204	0.00	0.00	a	a
10-07-94	57	1100	24.4	7.27	9.18						0.025	0.00025
10-08-94	58	1100	24.5	7.26	9.44							
10-09-94	59	1100	24.5	7.30	8.80							
10-10-94	60	1000	24.2	7.30	8.45							
10-11-94	61	1600	24.5	7.30	8.15							
10-12-94	62	900	23.9	7.31	8.85							
10-13-94	63	1300	24.5	7.23	7.45	40.8	85.5	209	0.00	0.00	a	a
10-14-94	64	1300	25.8	7.17	7.46							
10-15-94	65	900	25.2	7.30	7.91							
10-16-94	66	900	24.8	7.33	8.13							
10-17-94	67	1000	24.7	7.33	8.53							
10-18-94	68	800	24.6	7.13	7.88							
10-19-94	69	900	24.8	7.36	8.32							
10-20-94	70	900	24.3	7.23	8.21	40.8	85.5	211	0.00	0.00	0.022	0.00020
10-21-94	71	900	22.3	7.31	9.40							
10-22-94	72	800	24.1	7.38	8.70							
10-23-94	73	900	24.5	7.35	9.04							
10-24-94	74	900	24.3	7.37	8.57							
10-25-94	75	900	24.4	7.35	8.46							
10-26-94	76	800	24.2	7.37	8.58							

10-27-94	77	1100	24.9	7.38	8.78	40.8	85.5	204	0.00	0.00	0.017	0.00023
10-28-94	78	1000	24.6	7.39	8.85							
10-29-94	79	900	24.6	7.35	8.15							
10-30-94	80	900	24.9	7.36	8.93							
10-31-94	81	1000	25.0	7.29	9.33							
11-01-94	82	1100	25.4	7.26	9.07							
11-02-94	83	1000	25.0	7.35	9.09							
11-03-94	84	1000	24.8	7.25	8.06							
11-04-94	85	1000	25.1	7.19	8.24	40.8	85.5	215	0.00	0.00	0.062	0.00055
11-05-94	86	1000	25.0	7.40	9.29							
11-06-94	87	1000	25.3	7.25	9.00							
11-07-94	88	700	24.8	7.32	9.29							
11-08-94	89	1000	24.7	7.25	9.21							
11-09-94	90	1000	24.9	7.26	9.09							
11-10-94	91	1100	24.9	7.27	8.01							
11-11-94	92	900	24.4	7.25	8.27	40.8	85.5	218	0.00	0.00	0.063	0.00060
11-12-94	93	845	24.2	7.21	8.07							
11-13-94	94	830	24.4	7.22	8.60							
11-14-94	95	1000	24.4	7.22	8.77							
11-15-94	96	900	24.7	7.23	8.87							
11-16-94	97	900	24.7	7.29	8.35	40.8	85.5	202	0.00	0.00	0.041	0.00044
11-17-94	98	900	24.8	7.30	8.48							
11-18-94	99	900	24.9	7.26	8.32							
11-19-94	100	800	24.9	7.30	8.30							
11-20-94	101	900	24.7	7.28	8.55							
11-21-94	102	600	24.7	7.33	8.68							
11-22-94	103	600	24.8	7.35	8.52							
11-23-94	104	800	22.1	7.52	9.07	54.4	85.5	198	0.00	0.00	0.041	0.00062
11-24-94	105	730	22.5	7.15	8.37							
11-25-94	106	1020	22.1	7.15	9.83							
11-26-94	107	1000	22.2	7.22	8.94							
11-27-94	108	900	21.5	7.24	9.19							
11-28-94	109	900	22.1	7.21	9.16							
11-29-94	110	900	21.5	7.06	9.27							
11-30-94	111	900	21.5	7.03	9.11							
12-01-94	112	900	21.1	7.04	9.06	34.0	85.5	178	0.00	0.00	0.044	0.00021
12-02-94	113	1000	26.3	7.10	8.60							
12-03-94	114	1000	24.7	7.01	8.07							
12-04-94	115	1100	25.1	7.08	8.42							
12-05-94	116	900	24.9	7.18	8.11							
12-06-94	117	900	24.9	7.56	8.13							
12-07-94	118	800	25.0	7.60	8.98							
12-08-94	119	1100	25.1	7.65	8.01	88.4	68.4	270	0.00	0.00	0.048	0.00120
12-09-94	120	1000	24.9	7.67	7.90							

12-10-94	121	1300	25.2	7.66	7.78							
12-11-94	122	900	25.2	7.66	7.95							
12-12-94	123	900	24.3	7.63	8.51							
12-13-94	124	900	24.1	7.66	8.71							
12-14-94	125	900	23.9	7.67	8.78							
12-15-94	126	800	24.8	7.66	8.53	81.6	68.4	263	0.00	0.00	0.068	0.00170
12-16-94	127	1100	24.5	7.60	8.22							
12-17-94	128	845	25.1	7.56	7.78							
12-18-94	129	930	25.0	7.52	7.53							
12-19-94	130	1000	25.1	7.61	7.62							
12-20-94	131	1100	24.9	7.60	8.04							
12-21-94	132	1000	24.7	7.50	8.01	81.6	68.4	257	0.00	0.00	0.100	0.00173
12-22-94	133	800	24.7	7.70	7.79							
12-23-94	134	1000	24.8	7.66	7.84							
12-24-94	135	900	24.9	7.74	7.97							
12-25-94	136	700	23.7	7.72	8.49							
12-26-94	137	1000	23.9	7.58	8.33							
12-27-94	138	1100	24.5	7.76	8.19							
12-28-94	139	1000	24.5	7.65	8.62							
12-29-94	140	900	24.6	7.71	7.83	88.4	85.5	279	0.00	0.00	0.053	0.00146
12-30-94	141	1000	24.4	7.66	7.86							
12-31-94	142	1000	24.5	7.54	7.82							
01-01-95	143	1100	24.8	7.64	7.77							
01-02-95	144	1000	24.8	7.70	7.78							
01-03-95	145	1100	24.4	7.59	8.47							
01-04-95	146	900	24.5	7.71	7.97							
01-05-95	147	1100	24.0	7.71	9.02	95.2	68.4	281	0.00	0.00	0.032	0.00085
01-06-95	148	1000	23.2	7.54	8.72							
01-07-95	149	1130	23.5	7.49	9.19							
01-08-95	150	1030	23.2	7.68	9.21							
01-09-95	151	1000	23.3	7.64	9.66							
01-10-95	152	1000	24.0	7.74	7.92							
01-11-95	153	1000	24.2	7.68	7.39							
01-12-95	154	1100	24.3	7.68	7.23	95.2	102.6	295	0.00	0.00	0.032	0.00081
01-13-95	155	1000	24.2	7.71	6.94							
01-14-95	156	900	24.8	7.68	7.60							
01-15-95	157	800	25.3	7.65	7.68							
01-16-95	158	1030	25.0	7.65	7.76							
01-17-95	159	1000	24.7	7.67	8.13							
01-18-95	160	1000	24.6	7.72	7.23							
01-19-95	161	1000	24.8	7.73	7.44	88.4	85.5	280	0.00	0.00	a	a
01-20-95	162	1000	24.9	7.71	7.30							
01-21-95	163	1000	25.2	7.66	7.14							
01-22-95	164	1100	25.0	7.73	7.20							

01-23-95	165	600	24.6	7.85	7.78							
01-24-95	166	1000	24.8	7.76	8.25							
01-25-95	167	1100	22.7	7.74	7.63							
01-26-95	168	1100	23.3	7.66	7.49	95.2	85.5	286	0.00	0.00	0.013	0.00029
01-27-95	169	1000	23.2	7.64	7.60							
01-28-95	170	830	24.0	7.58	7.50							
01-29-95	171	900	23.9	7.63	8.08							
01-30-95	172	1000	24.3	7.47	7.69							
01-31-95	173	1000	22.8	7.54	8.11							
02-01-95	174	1000	25.3	7.58	7.39							
02-02-95	175	900	25.5	7.67	7.86	88.4	85.5	285	0.00	0.00	0.032	0.00086
02-03-95	176	930	25.0	7.63	7.78							
02-04-95	177	1000	25.1	7.51	8.12							
02-05-95	178	1200	24.3	7.32	8.11							
02-06-95	179	930	21.6	7.53	8.84							
02-07-95	180	900	22.8	7.51	8.50							
02-08-95	181	900	22.7	7.35	8.39							
02-09-95	182	900	21.2	7.36	9.36	47.6	102.6	247	0.00	0.00	0.015	0.00015
02-10-95	183	900	22.2	7.26	8.86							
02-11-95	184	900	21.2	7.21	9.33							
02-12-95	185	1200	21.0	7.11	9.64							
02-13-95	186	900	20.1	7.12	9.86							
02-14-95	187	900	20.0	7.17	9.66							
02-15-95	188	900	20.6	7.14	9.66							
02-16-95	189	900	20.9	7.15	9.53	40.8	85.5	243	0.00	0.00	0.027	0.00016
02-17-95	190	900	20.4	7.14	9.42							
02-18-95	191	1100	20.2	7.11	10.11							
02-19-95	192	1400	21.1	7.07	9.79							
02-20-95	193	1000	20.5	7.06	9.51							
02-21-95	194	1000	20.7	7.21	9.31							
02-22-95	195	900	20.6	7.22	9.47							
02-23-95	196	1000	21.6	7.16	9.47	34.0	85.5	245	0.00	0.00	0.041	0.00030
02-24-95	197	1000	21.4	7.23	9.07							
02-25-95	198	1000	20.8	7.24	9.23							
02-26-95	199	1800	21.2	7.33	9.55							
02-27-95	200	900	20.9	7.22	9.22							
02-28-95	201	900	21.8	7.22	9.19							
03-01-95	202	900	21.9	7.15	9.13							
03-02-95	203	900	21.2	7.23	9.35	40.8	85.5	344	0.00	0.00	0.012	0.00009
03-03-95	204	900	20.8	7.28	9.22							
03-04-95	205	1000	22.1	7.20	9.04							
03-05-95	206	1015	22.2	7.05	9.07							
03-06-95	207	900	22.4	7.19	9.02							
03-07-95	208	900	23.0	7.20	8.75							

03-08-95	209	900	22.8	7.29	8.72							
03-09-95	210	1000	23.2	7.24	8.67	40.8	85.5	240	0.00	0.00	0.014	0.00012
03-10-95	211	900	24.5	7.14	8.41							
03-11-95	212	1100	23.8	7.17	8.80							
03-12-95	213	1800	24.7	7.15	8.56							
03-13-95	214	900	23.8	7.20	8.65							
03-14-95	215	900	24.0	7.22	8.73							
03-15-95	216	900	24.0	7.22	8.51							
03-16-95	217	900	24.3	7.15	8.78	47.6	85.5	213	0.00	0.00	0.011	0.00008
03-17-95	218	900	24.5	7.21	8.47							
03-18-95	219	1000	23.9	7.30	8.34							
03-19-95	220	1600	25.4	7.23	8.39							
03-20-95	221	900	24.6	7.20	8.33							
03-21-95	222	900	24.8	7.22	8.03							
03-22-95	223	900	24.7	7.17	8.17							
03-23-95	224	1100	24.7	7.17	8.16	47.6	85.5	233	0.00	0.00	a	a
03-24-95	225	900	24.3	7.20	7.28							
03-25-95	226	915	24.7	7.07	7.91							
03-26-95	227	900	24.4	7.10	8.58							
03-27-95	228	900	24.7	7.19	8.00							
03-28-95	229	900	24.4	7.21	7.64							
03-29-95	230	900	24.2	7.20	7.56							
03-30-95	231	900	24.3	7.26	7.38	47.6	85.5	220	0.00	0.00	0.067	0.00056
03-31-95	232	900	24.5	7.19	7.18							
04-01-95	233	900	24.0	7.11	7.90							
04-02-95	234	1000	24.1	7.14	8.23							
04-03-95	235	900	23.6	7.23	8.19							
04-04-95	236	900	24.3	7.31	7.80							
04-05-95	237	900	23.7	7.26	7.61							
04-06-95	238	900	23.9	7.29	7.89	40.8	85.5	228	0.00	0.00	0.056	0.00042
04-07-95	239	900	24.3	7.25	7.68							
04-08-95	240	1100	24.5	7.26	8.00							
04-09-95	241	1300	24.9	7.28	8.34							
04-10-95	242	900	24.4	7.22	7.45							
04-11-95	243	900	24.6	7.25	7.55							
04-12-95	244	900	24.8	7.23	7.41							
04-13-95	245	1100	24.9	7.27	7.47	40.8	85.5	246	0.00	0.00	0.038	0.00030
04-14-95	246	900	24.6	7.16	7.08							
04-15-95	247	1400	25.1	7.27	7.82							
04-16-95	248	1100	24.8	7.22	7.71							
04-17-95	249	900	24.6	7.28	7.54							
04-18-95	250	900	24.6	7.27	7.77							
04-19-95	251	900	25.0	7.27	7.69							
04-20-95	252	900	24.8	7.27	7.67	40.8	85.5	220	0.00	0.00	a	a

04-21-95	253	900	25.0	7.32	7.45							
04-22-95	254	1200	25.5	7.29	7.57							
04-23-95	255	2000	25.0	7.28	7.90							
04-24-95	256	900	24.5	7.38	7.44							
04-25-95	257	900	24.5	7.26	7.28							
04-26-95	258	900	24.1	7.32	7.32							
04-27-95	259	900	24.6	7.28	7.27	40.8	85.5	223	0.00	0.00	a	a
04-28-95	260	900	24.8	7.28	7.22							
04-29-95	261	1100	24.8	7.28	7.06							
04-30-95	262	1600	24.8	7.26	7.90							
05-01-95	263	900	24.6	7.29	7.91							
05-02-95	264	900	24.5	7.34	8.53							
05-03-95	265	900	24.3	7.34	7.44							
05-04-95	266	900	24.5	7.30	7.70	40.8	85.5	224	0.00	0.00	a	a
05-05-95	267	900	24.8	7.31	7.78							
05-06-95	268	830	24.8	7.03	7.46							
05-07-95	269	900	24.6	7.06	7.26							
05-08-95	270	900	24.7	7.20	7.65							
05-09-95	271	900	24.7	7.22	7.29							
05-10-95	272	900	25.3	7.19	7.22							
MEAN			24.1		8.35	52.8	84.2	235			0.038	0.00053
MINIMUM			20.0	7.01	6.94	34.0	68.4	178	0.00	0.00	0.000	0.00000
MAXIMUM			26.3	7.85	10.11	95.2	102.6	344	0.00	0.00	0.100	0.00173
Std Dev			1.23		0.670	20.72	7.21	34.9			0.0231	0.000471
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 22
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.58	9.03							
08-13-94	2	900	25.1	7.29	7.57							
08-14-94	3	900	25.2	7.43	7.71							
08-15-94	4	900	24.9	7.36	7.97							
08-16-94	5	1000	25.0	7.37	7.57							
08-17-94	6	1000	25.0	7.26	7.31							
08-18-94	7	900	25.1	7.28	7.36	40.8	85.5	204	0.00	0.00	0.096	0.00104
08-19-94	8	800	24.9	7.25	8.22							
08-20-94	9	1000	24.9	7.30	8.18							
08-21-94	10	800	25.0	7.38	8.09							
08-22-94	11	900	24.9	7.46	8.11							
08-23-94	12	730	24.6	7.35	8.16							
08-24-94	13	1000	24.6	7.31	8.36							
08-25-94	14	1100	24.7	7.35	8.61	40.8	85.5	209	0.00	0.00	0.055	0.00068
08-26-94	15	900	24.7	7.36	8.28							
08-27-94	16	900	24.7	7.35	8.23							
08-28-94	17	800	24.8	7.36	8.16							
08-29-94	18	900	25.2	7.40	8.12							
08-30-94	19	900	24.6	7.42	8.20							
08-31-94	20	800	24.7	7.47	8.27							
09-01-94	21	1100	24.9	7.44	8.88	40.8	102.6	220	0.00	0.00	a	a
09-02-94	22	900	24.6	7.47	8.75							
09-03-94	23	815	24.3	7.41	8.17							
09-04-94	24	810	24.2	7.48	8.30							
09-05-94	25	1100	24.4	7.42	8.93							
09-06-94	26	900	24.1	7.42	8.91							
09-07-94	27	800	24.2	7.46	8.92							
09-08-94	28	1100	24.0	7.50	9.16	40.8	85.5	214	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.2	7.37	9.78							
09-10-94	30	900	24.3	7.54	9.17							
09-11-94	31	800	23.8	7.43	8.76							
09-12-94	32	500	23.9	7.50	8.35							

09-13-94	33	700	24.0	7.42	9.07							
09-14-94	34	1400	24.7	7.47	8.65							
09-15-94	35	1300	24.7	7.39	8.36							
09-16-94	36	1200	24.8	7.43	8.47	40.8	85.5	212	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.37	8.41							
09-18-94	38	830	24.8	7.39	8.57							
09-19-94	39	1000	24.5	7.41	8.56							
09-20-94	40	1000	24.4	7.46	8.73							
09-21-94	41	1000	24.7	7.43	8.65							
09-22-94	42	900	24.8	7.45	8.38	40.8	85.5	216	0.00	0.00	a	a
09-23-94	43	1000	24.7	7.48	8.84							
09-24-94	44	845	24.5	7.33	8.46							
09-25-94	45	1300	24.8	a	8.64							
09-26-94	46	900	24.7	7.27	8.19							
09-27-94	47	800	24.7	7.26	8.74							
09-28-94	48	1000	24.6	7.10	8.08	34.0	68.4	184	a	a	a	a
09-29-94	49	1030	24.6	7.23	7.74							
09-30-94	50	1030	24.3	7.37	8.73							
10-01-94	51	900	24.2	7.31	8.01							
10-02-94	52	915	24.4	7.31	8.98							
10-03-94	53	1100	24.0	7.31	9.08							
10-04-94	54	1100	23.9	7.31	8.87							
10-05-94	55	1000	24.3	7.28	9.10							
10-06-94	56	800	23.9	7.30	8.49	40.8	68.4	203	0.00	0.00	a	a
10-07-94	57	1100	24.3	7.27	9.18						0.024	0.00024
10-08-94	58	1100	24.4	7.26	9.30							
10-09-94	59	1100	24.5	7.30	8.78							
10-10-94	60	1000	24.1	7.30	8.48							
10-11-94	61	1600	24.5	7.30	8.13							
10-12-94	62	900	23.8	7.31	8.82							
10-13-94	63	1300	24.4	7.23	8.48	40.8	85.5	209	0.00	0.00	a	a
10-14-94	64	1300	25.8	7.17	7.39							
10-15-94	65	900	25.2	7.30	7.85							
10-16-94	66	900	24.7	7.33	8.12							
10-17-94	67	1000	24.8	7.33	8.46							
10-18-94	68	800	24.6	7.13	7.84							
10-19-94	69	900	24.8	7.36	8.27							
10-20-94	70	900	24.2	7.23	8.13	40.8	85.5	211	0.00	0.00	0.027	0.00024
10-21-94	71	900	22.3	7.31	9.38							
10-22-94	72	800	24.0	7.38	8.62							
10-23-94	73	900	24.4	7.35	8.97							
10-24-94	74	900	24.3	7.37	8.50							
10-25-94	75	900	24.4	7.35	8.40							
10-26-94	76	800	24.1	7.37	8.51							

10-27-94	77	1100	24.8	7.38	8.76	40.8	85.5	204	0.00	0.00	0.018	0.00024
10-28-94	78	1000	24.6	7.39	8.82							
10-29-94	79	900	24.6	7.35	8.11							
10-30-94	80	900	24.9	7.36	8.89							
10-31-94	81	1000	24.8	7.29	9.28							
11-01-94	82	1100	25.3	7.26	9.05							
11-02-94	83	1000	24.9	7.35	9.06							
11-03-94	84	1000	24.8	7.25	8.01							
11-04-94	85	1000	24.9	7.19	8.24	40.8	85.5	215	0.00	0.00	0.056	0.00049
11-05-94	86	1000	25.0	7.40	9.29							
11-06-94	87	1000	25.2	7.25	8.96							
11-07-94	88	700	24.7	7.32	9.20							
11-08-94	89	1000	24.7	7.25	9.16							
11-09-94	90	1000	24.8	7.26	9.06							
11-10-94	91	1100	24.8	7.27	7.98							
11-11-94	92	900	24.4	7.25	8.23	40.8	85.5	218	0.00	0.00	0.063	0.00060
11-12-94	93	845	24.1	7.23	7.90							
11-13-94	94	830	24.3	7.27	8.58							
11-14-94	95	1000	24.4	7.22	8.76							
11-15-94	96	900	24.7	7.23	8.85							
11-16-94	97	900	24.7	7.29	8.28	40.8	85.5	202	0.00	0.00	0.041	0.00044
11-17-94	98	900	24.8	7.30	8.42							
11-18-94	99	900	24.9	7.26	8.28							
11-19-94	100	800	24.9	7.30	8.21							
11-20-94	101	900	24.7	7.28	8.55							
11-21-94	102	600	24.7	7.33	8.60							
11-22-94	103	600	24.8	7.35	8.42							
11-23-94	104	800	22.1	7.52	9.07	54.4	85.5	198	0.00	0.00	0.040	0.00060
11-24-94	105	730	22.1	7.17	8.26							
11-25-94	106	1020	22.0	7.15	9.86							
11-26-94	107	1000	22.2	7.22	8.93							
11-27-94	108	900	21.5	7.24	9.18							
11-28-94	109	900	22.2	7.21	9.18							
11-29-94	110	900	21.5	7.06	9.24							
11-30-94	111	900	21.5	7.03	9.07							
12-01-94	112	900	21.2	7.04	9.05	34.0	85.5	178	0.00	0.00	0.048	0.00023
12-02-94	113	1000	26.0	7.11	8.54							
12-03-94	114	1000	24.6	7.04	8.12							
12-04-94	115	1100	24.9	7.08	8.35							
12-05-94	116	900	24.9	7.18	8.08							
12-06-94	117	900	24.9	7.56	8.09							
12-07-94	118	800	24.8	7.60	8.92							
12-08-94	119	1100	24.9	7.65	8.01	88.4	85.5	270	0.00	0.00	0.046	0.00113
12-09-94	120	1000	24.8	7.67	7.86							

12-10-94	121	1300	25.0	7.66	7.70							
12-11-94	122	900	25.0	7.66	7.85							
12-12-94	123	900	24.1	7.63	8.44							
12-13-94	124	900	23.8	7.66	8.70							
12-14-94	125	900	23.7	7.67	8.70							
12-15-94	126	800	24.7	7.66	8.42	81.6	68.4	261	0.00	0.00	0.061	0.00152
12-16-94	127	1100	24.4	7.60	8.16							
12-17-94	128	845	25.0	7.60	7.78							
12-18-94	129	930	25.0	7.57	7.56							
12-19-94	130	1000	25.0	7.61	7.74							
12-20-94	131	1100	24.8	7.60	8.11							
12-21-94	132	1000	24.5	7.50	8.01	81.6	68.4	256	0.00	0.00	0.100	0.00171
12-22-94	133	800	24.6	7.70	7.83							
12-23-94	134	1000	24.7	7.66	7.91							
12-24-94	135	900	24.9	7.74	8.00							
12-25-94	136	700	23.6	7.71	8.48							
12-26-94	137	1000	23.9	7.58	8.48							
12-27-94	138	1100	24.4	7.77	8.22							
12-28-94	139	1000	24.5	7.65	8.70							
12-29-94	140	900	24.6	7.71	7.93	88.4	85.5	278	0.00	0.00	0.048	0.00132
12-30-94	141	1000	24.4	7.66	7.96							
12-31-94	142	1000	24.5	7.54	8.00							
01-01-95	143	1100	24.8	7.64	7.92							
01-02-95	144	1000	24.7	7.70	7.92							
01-03-95	145	1100	24.4	7.59	8.51							
01-04-95	146	900	24.4	7.71	8.08							
01-05-95	147	1100	23.7	7.71	9.25	95.2	68.4	280	0.00	0.00	0.026	0.00067
01-06-95	148	1000	23.1	7.58	8.79							
01-07-95	149	1130	23.5	7.52	9.26							
01-08-95	150	1030	23.2	7.70	9.15							
01-09-95	151	1000	23.1	7.64	9.48							
01-10-95	152	1000	23.8	7.74	7.99							
01-11-95	153	1000	24.1	7.68	7.51							
01-12-95	154	1100	24.3	7.68	7.39	95.2	102.6	294	0.00	0.00	0.031	0.00078
01-13-95	155	1000	24.0	7.71	6.92							
01-14-95	156	900	24.6	7.68	7.68							
01-15-95	157	800	25.2	7.65	7.74							
01-16-95	158	1030	25.0	7.65	7.78							
01-17-95	159	1000	24.6	7.67	8.22							
01-18-95	160	1000	24.6	7.72	7.32							
01-19-95	161	1000	24.8	7.73	7.43	88.4	85.5	279	0.00	0.00	a	a
01-20-95	162	1000	24.9	7.71	7.38							
01-21-95	163	1000	25.1	7.66	7.26							
01-22-95	164	1100	24.9	7.73	7.34							

01-23-95	165	600	24.6	7.85	7.84							
01-24-95	166	1000	24.8	7.76	8.36							
01-25-95	167	1100	22.7	7.74	7.66							
01-26-95	168	1100	23.0	7.66	7.48	95.2	85.5	285	0.00	0.00	0.011	0.00025
01-27-95	169	1000	23.2	7.64	7.62							
01-28-95	170	830	24.3	7.62	7.58							
01-29-95	171	900	23.9	7.63	8.12							
01-30-95	172	1000	24.2	7.47	7.87							
01-31-95	173	1000	22.9	7.54	8.27							
02-01-95	174	1000	25.4	7.58	7.37							
02-02-95	175	900	25.5	7.67	7.85	88.4	85.5	284	0.00	0.00	0.028	0.00075
02-03-95	176	930	25.1	7.63	7.92							
02-04-95	177	1000	25.2	7.51	8.19							
02-05-95	178	1200	24.3	7.32	8.13							
02-06-95	179	930	21.7	7.53	8.92							
02-07-95	180	900	22.9	7.51	8.53							
02-08-95	181	900	22.9	7.35	8.60							
02-09-95	182	900	21.3	7.36	9.29	47.6	102.6	246	0.00	0.00	0.016	0.00016
02-10-95	183	900	22.3	7.26	8.83							
02-11-95	184	900	21.4	7.21	9.35							
02-12-95	185	1200	21.1	7.11	9.58							
02-13-95	186	900	20.3	7.12	9.80							
02-14-95	187	900	20.3	7.17	9.55							
02-15-95	188	900	20.9	7.14	9.62							
02-16-95	189	900	21.1	7.15	9.68	34.0	85.5	244	0.00	0.00	0.027	0.00016
02-17-95	190	900	20.6	7.14	9.61							
02-18-95	191	1100	20.5	7.11	10.08							
02-19-95	192	1400	21.5	7.07	9.79							
02-20-95	193	1000	20.9	7.06	9.65							
02-21-95	194	1000	21.1	7.21	9.60							
02-22-95	195	900	21.0	7.22	9.41							
02-23-95	196	1000	21.9	7.16	9.24	34.0	85.5	246	0.00	0.00	0.037	0.00020
02-24-95	197	1000	21.6	7.23	9.04							
02-25-95	198	1000	21.0	7.24	9.23							
02-26-95	199	1800	21.6	7.33	9.49							
02-27-95	200	900	21.4	7.22	9.29							
02-28-95	201	900	22.2	7.22	9.12							
03-01-95	202	900	22.2	7.15	8.99							
03-02-95	203	900	21.7	7.23	9.17	34.0	85.5	345	0.00	0.00	0.012	0.00009
03-03-95	204	900	21.3	7.28	9.15							
03-04-95	205	1000	22.5	7.20	8.83							
03-05-95	206	1015	22.6	7.06	8.98							
03-06-95	207	900	22.7	7.19	9.12							
03-07-95	208	900	23.3	7.20	8.71							

03-08-95	209	900	23.2	7.29	8.72							
03-09-95	210	1000	23.8	7.24	8.42	40.8	85.5	242	0.00	0.00	0.015	0.00014
03-10-95	211	900	25.1	7.14	8.19							
03-11-95	212	1100	24.4	7.17	8.40							
03-12-95	213	1800	25.2	7.15	8.35							
03-13-95	214	900	24.4	7.20	8.26							
03-14-95	215	900	24.5	7.22	8.62							
03-15-95	216	900	24.5	7.22	8.40							
03-16-95	217	900	25.0	7.15	8.56	47.6	85.5	215	0.00	0.00	0.011	0.00008
03-17-95	218	900	25.2	7.21	8.30							
03-18-95	219	1000	24.4	7.30	8.21							
03-19-95	220	1600	25.8	7.23	8.34							
03-20-95	221	900	25.0	7.20	8.23							
03-21-95	222	900	25.3	7.22	7.91							
03-22-95	223	900	25.2	7.17	8.02							
03-23-95	224	1100	25.1	7.17	7.81	47.6	85.5	234	0.00	0.00	a	a
03-24-95	225	900	24.9	7.20	6.95							
03-25-95	226	915	25.1	7.10	7.70							
03-26-95	227	900	25.1	7.13	8.45							
03-27-95	228	900	25.2	7.19	7.85							
03-28-95	229	900	25.0	7.21	7.43							
03-29-95	230	900	24.8	7.20	7.46							
03-30-95	231	900	24.8	7.26	7.04	47.6	85.5	220	0.00	0.00	0.068	0.00056
03-31-95	232	900	25.0	7.19	6.83							
04-01-95	233	900	24.2	7.13	7.56							
04-02-95	234	1000	24.5	7.17	8.10							
04-03-95	235	900	24.3	7.21	8.15							
04-04-95	236	900	24.9	7.31	7.60							
04-05-95	237	900	24.4	7.26	7.52							
04-06-95	238	900	24.5	7.29	7.73	40.8	85.5	230	0.00	0.00	0.056	0.00042
04-07-95	239	900	24.9	7.25	7.48							
04-08-95	240	1100	25.0	7.26	7.76							
04-09-95	241	1300	25.3	7.28	8.24							
04-10-95	242	900	25.0	7.22	7.37							
04-11-95	243	900	25.1	7.25	7.43							
04-12-95	244	900	25.3	7.23	7.19							
04-13-95	245	1100	25.2	7.27	7.24	40.8	85.5	248	0.00	0.00	0.036	0.00028
04-14-95	246	900	25.0	7.16	6.88							
04-15-95	247	1400	25.6	7.27	7.51							
04-16-95	248	1100	25.4	7.22	7.35							
04-17-95	249	900	25.2	7.28	7.31							
04-18-95	250	900	25.1	7.27	7.54							
04-19-95	251	900	25.4	7.27	7.60							
04-20-95	252	900	25.2	7.27	7.45	40.8	85.5	221	0.00	0.00	a	a

04-21-95	253	900	25.5	7.32	7.24							
04-22-95	254	1200	26.0	7.29	7.24							
04-23-95	255	2000	25.4	7.28	7.66							
04-24-95	256	900	24.9	7.38	7.20							
04-25-95	257	900	24.9	7.26	7.07							
04-26-95	258	900	24.6	7.32	7.09							
04-27-95	259	900	25.0	7.28	7.07	40.8	85.5	224	0.00	0.00	a	a
04-28-95	260	900	25.2	7.28	7.05							
04-29-95	261	1100	25.2	7.28	6.70							
04-30-95	262	1600	25.2	7.26	7.56							
05-01-95	263	900	25.1	7.29	7.81							
05-02-95	264	900	24.9	7.34	8.20							
05-03-95	265	900	24.8	7.34	7.42							
05-04-95	266	900	25.0	7.30	7.66	40.8	85.5	225	0.00	0.00	a	a
05-05-95	267	900	25.3	7.31	7.46							
05-06-95	268	830	25.2	7.01	7.25							
05-07-95	269	900	25.1	7.08	7.16							
05-08-95	270	900	25.2	7.20	7.33							
05-09-95	271	900	25.3	7.22	7.10							
05-10-95	272	900	25.8	7.19	7.18							
MEAN			24.2		8.30	52.4	84.6	235			0.038	0.00052
MINIMUM			20.3	7.01	6.70	34.0	68.4	178	0.00	0.00	0.000	0.00000
MAXIMUM			26.0	7.85	10.08	95.2	102.6	345	0.00	0.00	0.100	0.00171
Std Dev			1.20		0.696	20.98	7.79	34.7			0.0247	0.000446
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 23
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.64	9.09							
08-13-94	2	900	25.0	7.35	7.88							
08-14-94	3	900	25.2	7.50	7.94							
08-15-94	4	900	24.9	7.42	8.18							
08-16-94	5	1000	25.0	7.40	7.79							
08-17-94	6	1000	25.0	7.31	7.56							
08-18-94	7	900	25.0	7.32	7.49	40.8	85.5	204	0.00	0.00	0.145	0.00170
08-19-94	8	800	24.9	7.30	8.29							
08-20-94	9	1000	24.9	7.31	8.24							
08-21-94	10	800	25.0	7.40	8.20							
08-22-94	11	900	24.9	7.49	8.15							
08-23-94	12	730	24.6	7.38	8.25							
08-24-94	13	1000	24.6	7.34	8.44							
08-25-94	14	1100	24.7	7.39	8.64	40.8	85.5	208	0.00	0.00	0.076	0.00103
08-26-94	15	900	24.7	7.38	8.34							
08-27-94	16	900	24.7	7.39	8.26							
08-28-94	17	800	24.8	7.38	8.20							
08-29-94	18	900	25.1	7.44	8.16							
08-30-94	19	900	24.6	7.45	8.27							
08-31-94	20	800	24.7	7.47	8.32							
09-01-94	21	1100	24.9	7.46	8.89	40.8	85.5	219	0.00	0.00	a	a
09-02-94	22	900	24.6	7.49	8.82							
09-03-94	23	815	24.3	7.44	8.16							
09-04-94	24	810	24.2	7.52	8.28							
09-05-94	25	1100	24.3	7.42	8.96							
09-06-94	26	900	24.1	7.44	8.95							
09-07-94	27	800	24.1	7.46	8.98							
09-08-94	28	1100	24.0	7.50	9.20	40.8	85.5	214	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.1	7.37	9.79							
09-10-94	30	900	24.2	7.55	9.21							
09-11-94	31	800	23.8	7.45	8.78							
09-12-94	32	500	23.9	7.50	8.38							

09-13-94	33	700	24.0	7.42	9.12							
09-14-94	34	1400	24.6	7.47	8.71							
09-15-94	35	1300	24.6	7.42	8.44							
09-16-94	36	1200	24.7	7.45	8.52	40.8	85.5	212	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.44	8.36							
09-18-94	38	830	24.8	7.45	8.46							
09-19-94	39	1000	24.4	7.42	8.59							
09-20-94	40	1000	24.4	7.48	8.74							
09-21-94	41	1000	24.6	7.45	8.66							
09-22-94	42	900	24.9	7.45	8.49	40.8	85.5	216	0.00	0.00	a	a
09-23-94	43	1000	24.8	7.50	9.03							
09-24-94	44	845	24.5	7.34	8.36							
09-25-94	45	1300	24.9	a	8.70							
09-26-94	46	900	24.7	7.27	8.35							
09-27-94	47	800	24.8	7.26	8.83							
09-28-94	48	1000	24.6	7.10	8.11	34.0	85.5	183	a	a	a	a
09-29-94	49	1030	24.8	7.24	7.69							
09-30-94	50	1030	24.5	7.41	8.66							
10-01-94	51	900	24.2	7.33	7.94							
10-02-94	52	915	24.4	7.28	9.01							
10-03-94	53	1100	24.1	7.31	9.05							
10-04-94	54	1100	24.0	7.31	8.89							
10-05-94	55	1000	24.4	7.28	9.06							
10-06-94	56	800	24.1	7.30	8.46	40.8	68.4	204	0.00	0.00	a	a
10-07-94	57	1100	24.4	7.27	9.12						0.028	0.00028
10-08-94	58	1100	24.6	7.26	9.40							
10-09-94	59	1100	24.5	7.30	8.78							
10-10-94	60	1000	24.2	7.30	8.45							
10-11-94	61	1600	24.5	7.30	8.15							
10-12-94	62	900	24.0	7.31	8.80							
10-13-94	63	1300	24.5	7.23	8.44	40.8	85.5	209	0.00	0.00	a	a
10-14-94	64	1300	25.8	7.17	7.38							
10-15-94	65	900	25.2	7.30	7.88							
10-16-94	66	900	24.8	7.33	8.16							
10-17-94	67	1000	24.7	7.33	8.55							
10-18-94	68	800	24.7	7.13	7.90							
10-19-94	69	900	24.9	7.36	8.33							
10-20-94	70	900	24.3	7.23	8.16	40.8	85.5	209	0.00	0.00	0.028	0.00025
10-21-94	71	900	22.4	7.31	9.40							
10-22-94	72	800	24.1	7.38	8.70							
10-23-94	73	900	24.5	7.35	9.08							
10-24-94	74	900	24.4	7.37	8.60							
10-25-94	75	900	24.5	7.35	8.43							
10-26-94	76	800	24.3	7.37	8.57							

10-27-94	77	1100	24.9	7.38	8.80	40.8	85.5	203	0.00	0.00	0.018	0.00024
10-28-94	78	1000	24.7	7.39	8.88							
10-29-94	79	900	24.6	7.35	8.10							
10-30-94	80	900	24.9	7.36	8.93							
10-31-94	81	1000	24.9	7.29	9.33							
11-01-94	82	1100	25.3	7.26	9.10							
11-02-94	83	1000	25.0	7.35	9.11							
11-03-94	84	1000	24.8	7.25	8.07							
11-04-94	85	1000	25.0	7.19	8.27	40.8	85.5	215	0.00	0.00	0.055	0.00048
11-05-94	86	1000	25.1	7.40	9.32							
11-06-94	87	1000	25.2	7.25	8.98							
11-07-94	88	700	24.8	7.32	9.28							
11-08-94	89	1000	24.8	7.25	9.25							
11-09-94	90	1000	24.9	7.26	9.12							
11-10-94	91	1100	24.9	7.27	8.08							
11-11-94	92	900	24.4	7.25	8.41	40.8	85.5	218	0.00	0.00	0.066	0.00063
11-12-94	93	845	24.2	7.28	8.04							
11-13-94	94	830	24.5	7.29	8.60							
11-14-94	95	1000	24.5	7.22	8.81							
11-15-94	96	900	24.7	7.23	8.92							
11-16-94	97	900	24.7	7.29	8.36	40.8	85.5	201	0.00	0.00	0.043	0.00046
11-17-94	98	900	24.9	7.30	8.51							
11-18-94	99	900	25.0	7.26	8.34							
11-19-94	100	800	24.9	7.30	8.30							
11-20-94	101	900	24.7	7.28	8.64							
11-21-94	102	600	24.7	7.33	8.64							
11-22-94	103	600	24.8	7.35	8.45							
11-23-94	104	800	22.1	7.52	9.13	54.4	85.5	197	0.00	0.00	0.035	0.00053
11-24-94	105	730	22.4	7.16	8.41							
11-25-94	106	1020	22.1	7.14	9.80							
11-26-94	107	1000	22.2	7.22	9.03							
11-27-94	108	900	21.5	6.93	9.12							
11-28-94	109	900	22.2	7.21	9.26							
11-29-94	110	900	21.5	7.06	9.30							
11-30-94	111	900	21.5	7.03	9.09							
12-01-94	112	900	21.2	7.04	9.04	34.0	85.5	178	0.00	0.00	0.048	0.00023
12-02-94	113	1000	26.0	7.12	8.54							
12-03-94	114	1000	24.6	7.06	8.05							
12-04-94	115	1100	25.0	7.08	8.37							
12-05-94	116	900	24.9	7.18	8.06							
12-06-94	117	900	24.9	7.56	8.08							
12-07-94	118	800	24.9	7.60	8.97							
12-08-94	119	1100	24.9	7.65	8.04	88.4	68.4	270	0.00	0.00	0.036	0.00089
12-09-94	120	1000	24.8	7.67	7.88							

12-10-94	121	1300	25.1	7.66	7.72							
12-11-94	122	900	25.1	7.66	7.92							
12-12-94	123	900	24.1	7.63	8.51							
12-13-94	124	900	23.9	7.68	8.78							
12-14-94	125	900	23.7	7.67	8.84							
12-15-94	126	800	24.7	7.66	8.55	81.6	68.4	262	0.00	0.00	0.061	0.00152
12-16-94	127	1100	24.5	7.60	8.34							
12-17-94	128	845	25.0	7.63	7.81							
12-18-94	129	930	25.0	7.59	7.61							
12-19-94	130	1000	25.1	7.61	7.89							
12-20-94	131	1100	24.9	7.60	8.25							
12-21-94	132	1000	24.7	7.50	8.18	81.6	68.4	256	0.00	0.00	0.110	0.00190
12-22-94	133	800	24.8	7.70	7.96							
12-23-94	134	1000	24.8	7.66	7.96							
12-24-94	135	900	24.9	7.74	8.08							
12-25-94	136	700	23.7	7.79	8.47							
12-26-94	137	1000	23.7	7.64	8.55							
12-27-94	138	1100	24.5	7.81	8.24							
12-28-94	139	1000	24.5	7.71	8.77							
12-29-94	140	900	24.7	7.74	7.95	88.4	85.5	278	0.00	0.00	0.043	0.00128
12-30-94	141	1000	24.5	7.66	8.00							
12-31-94	142	1000	24.5	7.57	8.04							
01-01-95	143	1100	24.8	7.71	8.01							
01-02-95	144	1000	24.8	7.73	7.98							
01-03-95	145	1100	24.4	7.64	8.59							
01-04-95	146	900	24.5	7.71	8.10							
01-05-95	147	1100	24.1	7.73	9.07	95.2	68.4	281	0.00	0.00	0.027	0.00075
01-06-95	148	1000	23.0	7.63	8.75							
01-07-95	149	1130	23.6	7.56	9.27							
01-08-95	150	1030	23.2	7.72	9.19							
01-09-95	151	1000	23.2	7.67	9.63							
01-10-95	152	1000	24.0	7.77	8.09							
01-11-95	153	1000	24.2	7.68	7.52							
01-12-95	154	1100	24.2	7.70	7.42	95.2	102.6	293	0.00	0.00	0.030	0.00079
01-13-95	155	1000	24.4	7.71	6.95							
01-14-95	156	900	24.5	7.69	7.66							
01-15-95	157	800	25.0	7.68	7.79							
01-16-95	158	1030	24.8	7.65	7.70							
01-17-95	159	1000	24.4	7.70	8.27							
01-18-95	160	1000	24.5	7.75	7.30							
01-19-95	161	1000	24.6	7.73	7.51	88.4	85.5	277	0.00	0.00	a	a
01-20-95	162	1000	24.7	7.75	7.30							
01-21-95	163	1000	25.0	7.66	7.15							
01-22-95	164	1100	24.7	7.72	7.10							

01-23-95	165	600	24.6	7.85	7.71							
01-24-95	166	1000	24.4	7.76	8.46							
01-25-95	167	1100	22.5	7.78	7.52							
01-26-95	168	1100	23.1	7.66	7.49	95.2	85.5	284	0.00	0.00	0.012	0.00027
01-27-95	169	1000	23.1	7.64	7.62							
01-28-95	170	830	24.1	7.62	7.31							
01-29-95	171	900	23.6	7.62	8.12							
01-30-95	172	1000	24.0	7.47	7.81							
01-31-95	173	1000	22.5	7.54	8.25							
02-01-95	174	1000	25.1	7.58	7.50							
02-02-95	175	900	25.2	7.68	7.94	95.2	85.5	282	0.00	0.00	0.026	0.00070
02-03-95	176	930	24.8	7.64	7.86							
02-04-95	177	1000	24.9	7.51	8.14							
02-05-95	178	1200	24.0	7.32	8.09							
02-06-95	179	930	21.2	7.53	8.84							
02-07-95	180	900	22.4	7.51	8.35							
02-08-95	181	900	22.4	7.39	8.43							
02-09-95	182	900	21.0	7.36	9.26	47.6	102.6	243	0.00	0.00	0.015	0.00015
02-10-95	183	900	21.7	7.26	8.79							
02-11-95	184	900	20.8	7.21	9.51							
02-12-95	185	1200	20.5	7.11	9.80							
02-13-95	186	900	19.8	7.12	9.92							
02-14-95	187	900	19.6	7.17	9.64							
02-15-95	188	900	20.2	7.14	9.65							
02-16-95	189	900	20.5	7.15	9.68	34.0	85.5	241	0.00	0.00	0.026	0.00015
02-17-95	190	900	20.0	7.14	9.60							
02-18-95	191	1100	20.0	7.11	10.15							
02-19-95	192	1400	20.8	7.07	9.89							
02-20-95	193	1000	20.1	7.06	9.70							
02-21-95	194	1000	20.5	7.21	9.59							
02-22-95	195	900	20.4	7.22	9.33							
02-23-95	196	1000	21.3	7.16	9.23	34.0	85.5	242	0.00	0.00	0.029	0.00020
02-24-95	197	1000	21.0	7.23	9.09							
02-25-95	198	1000	20.4	7.24	9.38							
02-26-95	199	1800	21.0	7.33	9.49							
02-27-95	200	900	20.7	7.22	9.25							
02-28-95	201	900	21.5	7.22	9.18							
03-01-95	202	900	21.5	7.15	9.21							
03-02-95	203	900	21.0	7.23	9.24	34.0	85.5	340	0.00	0.00	0.013	0.00009
03-03-95	204	900	20.7	7.28	9.23							
03-04-95	205	1000	21.8	7.20	9.03							
03-05-95	206	1015	22.2	7.09	8.92							
03-06-95	207	900	22.2	7.19	9.12							
03-07-95	208	900	22.8	7.20	8.76							

03-08-95	209	900	22.8	7.29	8.61							
03-09-95	210	1000	23.2	7.24	8.53	40.8	85.5	239	0.00	0.00	0.015	0.00013
03-10-95	211	900	24.6	7.14	8.29							
03-11-95	212	1100	24.2	7.17	8.36							
03-12-95	213	1800	25.0	7.15	8.30							
03-13-95	214	900	24.1	7.20	8.30							
03-14-95	215	900	24.5	7.22	8.54							
03-15-95	216	900	24.3	7.22	8.38							
03-16-95	217	900	25.0	7.15	8.56	47.6	85.5	215	0.00	0.00	0.011	0.00008
03-17-95	218	900	25.2	7.21	8.30							
03-18-95	219	1000	24.3	7.30	8.10							
03-19-95	220	1600	25.6	7.23	8.29							
03-20-95	221	900	25.1	7.20	8.20							
03-21-95	222	900	25.3	7.22	7.88							
03-22-95	223	900	25.2	7.17	8.02							
03-23-95	224	1100	25.1	7.17	7.86	47.6	85.5	235	0.00	0.00	a	a
03-24-95	225	900	25.0	7.20	7.10							
03-25-95	226	915	24.9	7.12	7.82							
03-26-95	227	900	24.8	7.12	8.47							
03-27-95	228	900	24.9	7.19	7.87							
03-28-95	229	900	24.9	7.21	7.52							
03-29-95	230	900	24.7	7.20	7.39							
03-30-95	231	900	24.6	7.26	7.16	47.6	85.5	221	0.00	0.00	0.071	0.00059
03-31-95	232	900	25.0	7.19	6.98							
04-01-95	233	900	24.4	7.13	7.67							
04-02-95	234	1000	24.5	7.17	8.10							
04-03-95	235	900	24.2	7.23	7.91							
04-04-95	236	900	24.6	7.31	7.48							
04-05-95	237	900	24.3	7.26	7.31							
04-06-95	238	900	24.4	7.29	7.61	40.8	85.5	230	0.00	0.00	0.056	0.00042
04-07-95	239	900	24.5	7.25	7.41							
04-08-95	240	1100	24.8	7.26	7.75							
04-09-95	241	1300	25.1	7.28	8.08							
04-10-95	242	900	24.7	7.22	7.15							
04-11-95	243	900	24.9	7.25	7.27							
04-12-95	244	900	25.1	7.23	7.11							
04-13-95	245	1100	24.4	7.27	7.22	40.8	85.5	248	0.00	0.00	0.036	0.00028
04-14-95	246	900	25.0	7.16	6.72							
04-15-95	247	1400	25.3	7.27	7.52							
04-16-95	248	1100	24.9	7.22	7.38							
04-17-95	249	900	24.9	7.28	7.19							
04-18-95	250	900	24.9	7.27	7.48							
04-19-95	251	900	25.1	7.27	7.38							
04-20-95	252	900	24.8	7.27	7.38	40.8	85.5	220	0.00	0.00	a	a

04-21-95	253	900	25.1	7.32	7.18							
04-22-95	254	1200	25.7	7.29	7.21							
04-23-95	255	2000	25.1	7.28	7.68							
04-24-95	256	900	24.8	7.38	7.11							
04-25-95	257	900	24.7	7.26	7.01							
04-26-95	258	900	24.4	7.32	7.04							
04-27-95	259	900	24.8	7.28	7.07	40.8	85.5	223	0.00	0.00	a	a
04-28-95	260	900	24.9	7.28	6.95							
04-29-95	261	1100	25.0	7.28	6.71							
04-30-95	262	1600	25.0	7.26	7.56							
05-01-95	263	900	24.8	7.29	7.78							
05-02-95	264	900	24.7	7.34	8.17							
05-03-95	265	900	24.6	7.34	7.22							
05-04-95	266	900	24.7	7.30	7.53	40.8	85.5	223	0.00	0.00	a	a
05-05-95	267	900	25.1	7.31	7.32							
05-06-95	268	830	25.0	7.00	7.09							
05-07-95	269	900	25.0	7.06	6.96							
05-08-95	270	900	25.0	7.20	7.22							
05-09-95	271	900	25.0	7.22	6.98							
05-10-95	272	900	25.5	7.19	7.13							
MEAN			24.1		8.32	52.6	84.2	234			0.040	0.00055
MINIMUM			19.6	6.93	6.71	34.0	68.4	178	0.00	0.00	0.000	0.00000
MAXIMUM			26.0	7.85	10.15	95.2	102.6	340	0.00	0.00	0.145	0.00190
Std Dev			1.33		0.722	21.32	7.21	34.2			0.0312	0.000501
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 24
TANK CONCENTRATION: 1% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.8	7.64	9.05							
08-13-94	2	900	25.1	7.34	7.56							
08-14-94	3	900	25.3	7.50	7.60							
08-15-94	4	900	25.0	7.41	7.99							
08-16-94	5	1000	25.1	7.40	7.53							
08-17-94	6	1000	25.1	7.30	7.20							
08-18-94	7	900	25.1	7.32	7.17	40.8	85.5	204	0.00	0.00	0.175	0.00207
08-19-94	8	800	24.9	7.30	8.30							
08-20-94	9	1000	25.0	7.31	8.22							
08-21-94	10	800	25.0	7.40	8.16							
08-22-94	11	900	25.0	7.49	8.17							
08-23-94	12	730	24.7	7.38	8.23							
08-24-94	13	1000	24.6	7.34	8.43							
08-25-94	14	1100	24.6	7.39	8.73	40.8	85.5	208	0.00	0.00	0.079	0.00106
08-26-94	15	900	24.7	7.38	8.38							
08-27-94	16	900	24.8	7.39	8.34							
08-28-94	17	800	24.8	7.38	8.23							
08-29-94	18	900	25.2	7.44	8.16							
08-30-94	19	900	24.6	7.45	8.33							
08-31-94	20	800	24.8	7.47	8.31							
09-01-94	21	1100	25.0	7.46	8.87	40.8	102.6	219	0.00	0.00	a	a
09-02-94	22	900	24.6	7.49	8.81							
09-03-94	23	815	24.3	7.44	8.09							
09-04-94	24	810	24.2	7.56	8.21							
09-05-94	25	1100	24.3	7.42	8.93							
09-06-94	26	900	24.1	7.44	8.97							
09-07-94	27	800	24.2	7.46	8.97							
09-08-94	28	1100	24.1	7.50	9.20	40.8	85.5	214	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.2	7.37	9.78							
09-10-94	30	900	24.2	7.55	9.22							
09-11-94	31	800	23.8	7.45	8.79							
09-12-94	32	500	24.0	7.50	8.39							

09-13-94	33	700	24.0	7.42	9.11							
09-14-94	34	1400	24.6	7.47	8.71							
09-15-94	35	1300	24.7	7.42	8.40							
09-16-94	36	1200	24.7	7.45	8.51	40.8	85.5	212	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.7	7.40	8.29							
09-18-94	38	830	24.8	7.39	8.51							
09-19-94	39	1000	24.4	7.42	8.60							
09-20-94	40	1000	24.4	7.48	8.77							
09-21-94	41	1000	24.7	7.45	8.71							
09-22-94	42	900	24.6	7.45	8.53	40.8	85.5	216	0.00	0.00	a	a
09-23-94	43	1000	24.7	7.50	9.01							
09-24-94	44	845	24.5	7.31	8.40							
09-25-94	45	1300	24.7	a	8.76							
09-26-94	46	900	24.6	7.27	8.35							
09-27-94	47	800	24.6	7.26	8.88							
09-28-94	48	1000	24.5	7.10	8.15	34.0	68.4	183	a	a	a	a
09-29-94	49	1030	24.8	7.26	7.71							
09-30-94	50	1030	24.4	7.36	8.70							
10-01-94	51	900	24.2	7.27	7.90							
10-02-94	52	915	24.4	7.29	9.03							
10-03-94	53	1100	24.1	7.31	9.12							
10-04-94	54	1100	23.9	7.31	8.95							
10-05-94	55	1000	24.3	7.28	9.12							
10-06-94	56	800	24.0	7.30	8.46	40.8	85.5	203	0.00	0.00	a	a
10-07-94	57	1100	24.3	7.27	9.16						0.026	0.00026
10-08-94	58	1100	24.4	7.26	9.42							
10-09-94	59	1100	24.5	7.30	8.82							
10-10-94	60	1000	24.1	7.30	8.50							
10-11-94	61	1600	24.4	7.30	8.18							
10-12-94	62	900	23.8	7.31	8.83							
10-13-94	63	1300	24.4	7.23	8.45	40.8	85.5	209	0.00	0.00	a	a
10-14-94	64	1300	25.7	7.17	7.42							
10-15-94	65	900	25.2	7.30	7.86							
10-16-94	66	900	24.7	7.33	8.13							
10-17-94	67	1000	24.8	7.33	8.52							
10-18-94	68	800	24.6	7.13	7.88							
10-19-94	69	900	24.7	7.36	8.35							
10-20-94	70	900	24.2	7.23	8.17	40.8	85.5	209	0.00	0.00	0.026	0.00024
10-21-94	71	900	22.3	7.31	9.36							
10-22-94	72	800	24.0	7.38	8.72							
10-23-94	73	900	24.4	7.35	9.08							
10-24-94	74	900	24.2	7.37	8.58							
10-25-94	75	900	24.3	7.35	8.45							
10-26-94	76	800	24.2	7.37	8.60							

10-27-94	77	1100	24.8	7.38	8.76	40.8	85.5	203	0.00	0.00	0.016	0.00021
10-28-94	78	1000	24.6	7.39	8.85							
10-29-94	79	900	24.5	7.35	8.09							
10-30-94	80	900	24.8	7.36	8.88							
10-31-94	81	1000	24.8	7.29	9.33							
11-01-94	82	1100	25.2	7.26	9.07							
11-02-94	83	1000	24.8	7.35	9.06							
11-03-94	84	1000	24.7	7.25	8.04							
11-04-94	85	1000	24.9	7.19	8.21	40.8	85.5	215	0.00	0.00	0.052	0.00045
11-05-94	86	1000	24.9	7.40	9.24							
11-06-94	87	1000	25.1	7.25	8.96							
11-07-94	88	700	24.7	7.32	9.31							
11-08-94	89	1000	24.6	7.25	9.21							
11-09-94	90	1000	24.7	7.26	9.08							
11-10-94	91	1100	24.7	7.27	8.12							
11-11-94	92	900	24.4	7.25	8.38	40.8	85.5	217	0.00	0.00	0.061	0.00059
11-12-94	93	845	24.2	7.25	8.00							
11-13-94	94	830	24.4	7.25	8.55							
11-14-94	95	1000	24.4	7.22	8.81							
11-15-94	96	900	24.6	7.23	8.89							
11-16-94	97	900	24.6	7.29	8.39	40.8	85.5	201	0.00	0.00	0.042	0.00045
11-17-94	98	900	24.8	7.30	8.50							
11-18-94	99	900	24.9	7.26	8.34							
11-19-94	100	800	24.7	7.30	8.40							
11-20-94	101	900	24.6	7.28	8.58							
11-21-94	102	600	24.5	7.33	8.70							
11-22-94	103	600	24.8	7.35	8.49							
11-23-94	104	800	22.1	7.52	9.05	54.4	85.5	197	0.00	0.00	0.041	0.00062
11-24-94	105	730	22.5	7.15	8.35							
11-25-94	106	1020	22.0	7.16	9.29							
11-26-94	107	1000	22.3	7.22	8.97							
11-27-94	108	900	21.6	7.24	9.22							
11-28-94	109	900	22.3	7.21	9.20							
11-29-94	110	900	21.6	7.06	9.27							
11-30-94	111	900	21.6	7.03	9.05							
12-01-94	112	900	21.2	7.04	9.00	34.0	85.5	178	0.00	0.00	0.045	0.00021
12-02-94	113	1000	26.1	7.11	8.50							
12-03-94	114	1000	24.7	7.08	8.02							
12-04-94	115	1100	24.9	7.08	8.30							
12-05-94	116	900	24.9	7.18	8.00							
12-06-94	117	900	24.9	7.56	8.03							
12-07-94	118	800	24.9	7.60	8.94							
12-08-94	119	1100	24.9	7.65	8.00	88.4	68.4	270	0.00	0.00	0.039	0.00096
12-09-94	120	1000	24.8	7.67	7.85							

12-10-94	121	1300	25.1	7.66	7.67							
12-11-94	122	900	25.1	7.66	7.88							
12-12-94	123	900	24.1	7.63	8.42							
12-13-94	124	900	23.9	7.68	8.66							
12-14-94	125	900	23.6	7.67	8.75							
12-15-94	126	800	24.6	7.66	8.53	81.6	68.4	261	0.00	0.00	0.063	0.00156
12-16-94	127	1100	24.5	7.60	8.19							
12-17-94	128	845	25.1	7.61	7.75							
12-18-94	129	930	25.0	7.62	7.46							
12-19-94	130	1000	25.0	7.61	7.68							
12-20-94	131	1100	24.6	7.60	8.07							
12-21-94	132	1000	24.5	7.50	8.02	81.6	68.4	256	0.00	0.00	0.110	0.00188
12-22-94	133	800	24.6	7.70	7.84							
12-23-94	134	1000	24.6	7.66	7.83							
12-24-94	135	900	24.7	7.74	7.97							
12-25-94	136	700	23.4	7.82	8.47							
12-26-94	137	1000	23.5	7.64	8.36							
12-27-94	138	1100	24.3	7.81	8.20							
12-28-94	139	1000	24.3	7.71	8.70							
12-29-94	140	900	24.4	7.74	7.86	88.4	85.5	276	0.00	0.00	0.042	0.00122
12-30-94	141	1000	24.3	7.66	7.88							
12-31-94	142	1000	24.2	7.57	7.96							
01-01-95	143	1100	24.6	7.71	7.84							
01-02-95	144	1000	24.6	7.73	7.88							
01-03-95	145	1100	24.2	7.64	8.49							
01-04-95	146	900	24.3	7.71	7.96							
01-05-95	147	1100	23.7	7.73	9.06	95.2	68.4	281	0.00	0.00	0.024	0.00065
01-06-95	148	1000	22.8	7.59	8.69							
01-07-95	149	1130	23.3	7.50	9.18							
01-08-95	150	1030	23.1	7.71	9.17							
01-09-95	151	1000	23.0	7.67	9.68							
01-10-95	152	1000	23.7	7.77	8.10							
01-11-95	153	1000	24.0	7.68	7.49							
01-12-95	154	1100	24.4	7.70	7.10	88.4	102.6	292	0.00	0.00	0.030	0.00080
01-13-95	155	1000	24.1	7.71	7.02							
01-14-95	156	900	24.4	7.69	7.64							
01-15-95	157	800	24.9	7.68	7.82							
01-16-95	158	1030	24.7	7.65	7.88							
01-17-95	159	1000	24.3	7.70	8.24							
01-18-95	160	1000	24.4	7.75	7.37							
01-19-95	161	1000	24.5	7.73	7.63	88.4	85.5	277	0.00	0.00	a	a
01-20-95	162	1000	24.6	7.75	7.46							
01-21-95	163	1000	24.8	7.66	7.26							
01-22-95	164	1100	24.7	7.72	7.28							

01-23-95	165	600	24.4	7.85	7.86							
01-24-95	166	1000	24.5	7.76	8.52							
01-25-95	167	1100	22.4	7.78	7.76							
01-26-95	168	1100	23.0	7.66	7.68	95.2	85.5	284	0.00	0.00	0.012	0.00027
01-27-95	169	1000	22.9	7.64	7.81							
01-28-95	170	830	23.9	7.61	7.63							
01-29-95	171	900	23.5	7.62	8.22							
01-30-95	172	1000	23.8	7.47	7.86							
01-31-95	173	1000	22.3	7.54	8.36							
02-01-95	174	1000	24.9	7.58	7.45							
02-02-95	175	900	25.1	7.68	7.92	95.2	85.5	282	0.00	0.00	0.027	0.00072
02-03-95	176	930	24.6	7.64	7.93							
02-04-95	177	1000	24.8	7.51	8.20							
02-05-95	178	1200	23.9	7.32	8.24							
02-06-95	179	930	21.1	7.53	8.96							
02-07-95	180	900	22.3	7.51	8.55							
02-08-95	181	900	22.3	7.39	8.62							
02-09-95	182	900	20.7	7.36	9.40	47.6	102.6	243	0.00	0.00	0.015	0.00014
02-10-95	183	900	21.7	7.26	8.88							
02-11-95	184	900	20.6	7.21	9.47							
02-12-95	185	1200	20.4	7.11	9.71							
02-13-95	186	900	19.6	7.12	9.85							
02-14-95	187	900	19.4	7.17	9.66							
02-15-95	188	900	20.2	7.14	9.70							
02-16-95	189	900	20.5	7.15	9.69	34.0	85.5	240	0.00	0.00	0.026	0.00015
02-17-95	190	900	19.8	7.14	9.65							
02-18-95	191	1100	19.7	7.11	10.14							
02-19-95	192	1400	20.6	7.07	9.96							
02-20-95	193	1000	20.2	7.06	9.60							
02-21-95	194	1000	20.4	7.21	9.58							
02-22-95	195	900	20.3	7.22	9.38							
02-23-95	196	1000	21.2	7.16	9.24	34.0	85.5	242	0.00	0.00	0.031	0.00020
02-24-95	197	1000	21.0	7.23	9.02							
02-25-95	198	1000	20.4	7.24	9.27							
02-26-95	199	1800	20.9	7.33	9.43							
02-27-95	200	900	20.6	7.22	9.28							
02-28-95	201	900	21.6	7.22	9.07							
03-01-95	202	900	21.6	7.15	9.18							
03-02-95	203	900	20.9	7.23	9.23	34.0	85.5	341	0.00	0.00	0.014	0.00010
03-03-95	204	900	20.7	7.28	9.17							
03-04-95	205	1000	21.9	7.20	9.02							
03-05-95	206	1015	22.0	7.06	8.99							
03-06-95	207	900	22.1	7.19	9.06							
03-07-95	208	900	22.8	7.20	8.81							

03-08-95	209	900	22.8	7.29	8.59							
03-09-95	210	1000	23.1	7.24	8.59	40.8	85.5	238	0.00	0.00	0.013	0.00011
03-10-95	211	900	24.3	7.14	8.32							
03-11-95	212	1100	23.9	7.17	8.48							
03-12-95	213	1800	24.6	7.15	8.30							
03-13-95	214	900	24.0	7.20	8.23							
03-14-95	215	900	24.2	7.22	8.52							
03-15-95	216	900	24.3	7.22	8.35							
03-16-95	217	900	24.7	7.15	8.52	47.6	85.5	215	0.00	0.00	0.011	0.00008
03-17-95	218	900	25.1	7.21	8.24							
03-18-95	219	1000	24.3	7.30	8.05							
03-19-95	220	1600	25.6	7.23	8.19							
03-20-95	221	900	25.0	7.20	8.16							
03-21-95	222	900	25.2	7.22	7.81							
03-22-95	223	900	25.2	7.17	7.97							
03-23-95	224	1100	25.1	7.17	7.82	47.6	85.5	236	0.00	0.00	a	a
03-24-95	225	900	25.0	7.20	6.98							
03-25-95	226	915	24.8	7.09	7.79							
03-26-95	227	900	25.2	7.06	8.40							
03-27-95	228	900	25.2	7.19	7.75							
03-28-95	229	900	24.9	7.21	7.46							
03-29-95	230	900	24.8	7.20	7.33							
03-30-95	231	900	24.7	7.26	7.15	47.6	85.5	221	0.00	0.00	0.073	0.00061
03-31-95	232	900	25.0	7.19	6.98							
04-01-95	233	900	24.6	7.12	7.54							
04-02-95	234	1000	24.6	7.17	8.20							
04-03-95	235	900	24.4	7.23	7.96							
04-04-95	236	900	24.8	7.31	7.51							
04-05-95	237	900	24.4	7.26	7.24							
04-06-95	238	900	24.6	7.29	7.52	40.8	85.5	231	0.00	0.00	0.056	0.00042
04-07-95	239	900	24.8	7.25	7.44							
04-08-95	240	1100	24.9	7.26	7.60							
04-09-95	241	1300	25.3	7.28	8.01							
04-10-95	242	900	24.9	7.22	7.15							
04-11-95	243	900	25.2	7.25	7.22							
04-12-95	244	900	25.2	7.23	7.10							
04-13-95	245	1100	25.1	7.27	7.00	40.8	85.5	249	0.00	0.00	0.033	0.00026
04-14-95	246	900	25.1	7.16	6.65							
04-15-95	247	1400	25.5	7.05	7.36							
04-16-95	248	1100	25.3	7.22	7.30							
04-17-95	249	900	25.2	7.28	7.13							
04-18-95	250	900	25.2	7.27	7.31							
04-19-95	251	900	25.4	7.27	7.29							
04-20-95	252	900	25.1	7.27	7.27	40.8	85.5	221	0.00	0.00	a	a

04-21-95	253	900	25.3	7.32	7.11							
04-22-95	254	1200	25.8	7.29	7.18							
04-23-95	255	2000	25.3	7.28	7.50							
04-24-95	256	900	25.0	7.38	7.08							
04-25-95	257	900	24.9	7.26	6.92							
04-26-95	258	900	24.7	7.32	6.92							
04-27-95	259	900	24.9	7.28	6.90	40.8	85.5	224	0.00	0.00	a	a
04-28-95	260	900	25.1	7.28	6.91							
04-29-95	261	1100	25.1	7.28	6.75							
04-30-95	262	1600	25.2	7.26	7.56							
05-01-95	263	900	25.1	7.29	7.80							
05-02-95	264	900	25.0	7.34	8.07							
05-03-95	265	900	24.7	7.34	7.36							
05-04-95	266	900	24.8	7.30	7.53	40.8	85.5	224	0.00	0.00	a	a
05-05-95	267	900	25.4	7.31	7.29							
05-06-95	268	830	25.2	7.03	7.11							
05-07-95	269	900	25.1	7.09	7.05							
05-08-95	270	900	25.2	7.20	7.22							
05-09-95	271	900	25.2	7.22	7.02							
05-10-95	272	900	25.7	7.19	7.26							
MEAN			24.1		8.30	52.4	84.6	234			0.041	0.00056
MINIMUM			19.4	7.03	6.65	34.0	68.4	178	0.00	0.00	0.000	0.00000
MAXIMUM			26.1	7.85	10.14	95.2	102.6	341	0.00	0.00	0.175	0.00207
Std Dev			1.36		0.730	20.98	7.79	34.1			0.0351	0.000537
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 25
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.8	7.22	8.98							
08-13-94	2	900	25.1	7.22	7.89							
08-14-94	3	900	25.3	7.28	7.85							
08-15-94	4	900	25.0	7.12	8.10							
08-16-94	5	1000	25.1	7.09	7.70							
08-17-94	6	1000	25.1	7.10	7.52							
08-18-94	7	900	25.1	7.02	7.51	40.8	85.5	212	0.00	0.00	0.146	0.00087
08-19-94	8	800	25.0	6.94	8.21							
08-20-94	9	1000	25.1	6.97	8.18							
08-21-94	10	800	25.1	7.05	8.09							
08-22-94	11	900	25.0	7.10	8.10							
08-23-94	12	730	24.8	7.01	8.09							
08-24-94	13	1000	24.8	6.96	8.29							
08-25-94	14	1100	24.9	7.02	8.57	34.0	85.5	217	0.00	0.00	0.097	0.00057
08-26-94	15	900	24.9	7.05	8.32							
08-27-94	16	900	24.9	7.06	8.21							
08-28-94	17	800	24.9	7.03	8.19							
08-29-94	18	900	25.3	7.05	8.17							
08-30-94	19	900	24.7	7.07	8.14							
08-31-94	20	800	24.9	7.10	8.22							
09-01-94	21	1100	25.0	7.10	8.85	40.8	102.6	229	0.00	0.00	a	a
09-02-94	22	900	24.7	7.10	8.73							
09-03-94	23	815	24.5	7.24	8.20							
09-04-94	24	810	24.5	7.26	8.25							
09-05-94	25	1100	24.6	7.06	8.89							
09-06-94	26	900	24.4	7.05	8.88							
09-07-94	27	800	24.4	7.10	8.88							
09-08-94	28	1100	24.3	7.13	9.10	40.8	85.5	224	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.4	7.01	9.69							
09-10-94	30	900	24.5	7.17	9.09							
09-11-94	31	800	24.0	7.06	8.69							
09-12-94	32	500	24.1	7.08	8.27							

09-13-94	33	700	24.3	7.05	8.96							
09-14-94	34	1400	24.8	7.09	8.57							
09-15-94	35	1300	24.8	7.05	8.33							
09-16-94	36	1200	24.9	7.04	8.40	40.8	85.5	222	0.00	0.00	0.004	0.00002
09-17-94	37	820	24.9	7.16	8.19							
09-18-94	38	830	24.9	7.15	8.48							
09-19-94	39	1000	24.6	6.98	8.48							
09-20-94	40	1000	24.6	7.01	8.57							
09-21-94	41	1000	24.8	7.01	8.52							
09-22-94	42	900	24.9	7.08	8.35	40.8	85.5	227	0.00	0.00	a	a
09-23-94	43	1000	24.9	7.11	8.87							
09-24-94	44	845	24.7	7.17	8.40							
09-25-94	45	1300	24.9	a	8.55							
09-26-94	46	900	24.8	6.90	8.20							
09-27-94	47	800	24.9	6.94	8.71							
09-28-94	48	1000	24.7	6.76	7.98	34.0	85.5	195	a	a	a	a
09-29-94	49	1030	24.6	7.18	7.86							
09-30-94	50	1030	24.4	7.16	8.65							
10-01-94	51	900	24.2	7.12	7.95							
10-02-94	52	915	24.5	7.12	9.05							
10-03-94	53	1100	24.1	7.01	8.98							
10-04-94	54	1100	24.0	7.01	8.81							
10-05-94	55	1000	24.4	7.00	9.00							
10-06-94	56	800	24.1	7.02	8.37	40.8	85.5	214	0.00	0.00	a	a
10-07-94	57	1100	24.5	7.01	9.04						0.027	0.00015
10-08-94	58	1100	24.6	6.98	9.31							
10-09-94	59	1100	24.7	7.00	8.66							
10-10-94	60	1000	24.3	7.03	8.38							
10-11-94	61	1600	24.6	7.04	8.06							
10-12-94	62	900	24.0	7.05	8.74							
10-13-94	63	1300	24.6	7.01	8.33	40.8	85.5	220	0.00	0.00	a	a
10-14-94	64	1300	25.8	6.97	7.34							
10-15-94	65	900	25.2	7.04	7.82							
10-16-94	66	900	24.7	7.08	8.07							
10-17-94	67	1000	24.8	7.08	8.45							
10-18-94	68	800	24.6	6.92	7.84							
10-19-94	69	900	24.8	7.13	8.27							
10-20-94	70	900	24.4	7.00	8.10	40.8	85.5	219	0.00	0.00	0.023	0.00012
10-21-94	71	900	22.5	7.07	9.25							
10-22-94	72	800	24.1	7.13	8.60							
10-23-94	73	900	24.5	7.07	8.85							
10-24-94	74	900	24.3	7.08	8.42							
10-25-94	75	900	24.4	7.08	8.34							
10-26-94	76	800	24.3	7.11	8.47							

10-27-94	77	1100	24.9	7.10	8.70	40.8	85.5	213	0.00	0.00	0.022	0.00016
10-28-94	78	1000	24.6	7.12	8.76							
10-29-94	79	900	24.6	7.12	8.07							
10-30-94	80	900	25.0	7.12	8.81							
10-31-94	81	1000	25.0	7.07	9.22							
11-01-94	82	1100	25.4	7.05	8.98							
11-02-94	83	1000	25.0	7.08	8.96							
11-03-94	84	1000	24.8	7.06	8.03							
11-04-94	85	1000	25.0	7.00	8.14	40.8	85.5	224	0.00	0.00	0.064	0.00036
11-05-94	86	1000	25.1	7.20	9.22							
11-06-94	87	1000	25.3	7.03	8.91							
11-07-94	88	700	24.8	7.10	9.21							
11-08-94	89	1000	24.8	7.03	9.08							
11-09-94	90	1000	24.9	7.04	9.00							
11-10-94	91	1100	24.8	7.06	7.98							
11-11-94	92	900	24.4	7.03	8.22	40.8	85.5	227	0.00	0.00	0.056	0.00033
11-12-94	93	845	24.1	7.13	7.98							
11-13-94	94	830	24.5	7.16	8.51							
11-14-94	95	1000	24.5	7.03	8.71							
11-15-94	96	900	24.8	7.03	8.81							
11-16-94	97	900	24.7	7.08	8.30	40.8	85.5	211	0.00	0.00	0.034	0.00023
11-17-94	98	900	24.9	7.09	8.44							
11-18-94	99	900	25.1	7.04	8.27							
11-19-94	100	800	24.9	7.09	8.26							
11-20-94	101	900	24.8	7.07	8.48							
11-21-94	102	600	24.7	7.10	8.52							
11-22-94	103	600	24.9	7.10	8.35							
11-23-94	104	800	22.2	7.24	8.91	47.6	85.5	206	0.00	0.00	0.045	0.00036
11-24-94	105	730	22.5	7.08	8.28							
11-25-94	106	1020	22.1	7.09	9.73							
11-26-94	107	1000	22.2	6.98	8.87							
11-27-94	108	900	21.5	6.93	9.12							
11-28-94	109	900	22.2	6.93	9.09							
11-29-94	110	900	21.5	6.78	9.17							
11-30-94	111	900	21.5	6.77	8.97							
12-01-94	112	900	21.1	6.77	8.98	27.2	85.5	188	0.00	0.00	0.044	0.00011
12-02-94	113	1000	26.5	7.06	8.44							
12-03-94	114	1000	25.0	7.02	8.08							
12-04-94	115	1100	25.3	6.88	8.33							
12-05-94	116	900	25.1	6.92	8.01							
12-06-94	117	900	25.0	7.35	8.07							
12-07-94	118	800	25.0	7.37	8.92							
12-08-94	119	1100	25.1	7.32	7.89	88.4	68.4	278	0.00	0.00	0.033	0.00039
12-09-94	120	1000	24.9	7.42	7.82							

12-10-94	121	1300	25.2	7.39	7.59							
12-11-94	122	900	25.3	7.40	7.85							
12-12-94	123	900	24.3	7.38	8.44							
12-13-94	124	900	24.1	7.42	8.70							
12-14-94	125	900	24.0	7.44	8.74							
12-15-94	126	800	25.0	7.44	8.53	81.6	68.4	271	0.00	0.00	0.061	0.00094
12-16-94	127	1100	24.9	7.40	8.12							
12-17-94	128	845	25.3	7.56	7.70							
12-18-94	129	930	25.3	7.49	7.55							
12-19-94	130	1000	25.4	7.31	7.54							
12-20-94	131	1100	25.1	7.38	7.98							
12-21-94	132	1000	24.9	7.31	7.88	81.6	68.4	265	0.00	0.00	0.100	0.00114
12-22-94	133	800	24.8	7.46	7.83							
12-23-94	134	1000	25.0	7.32	7.65							
12-24-94	135	900	25.1	7.47	7.87							
12-25-94	136	700	23.9	7.63	8.35							
12-26-94	137	1000	24.1	7.32	8.17							
12-27-94	138	1100	24.7	7.48	8.01							
12-28-94	139	1000	24.7	7.44	8.49							
12-29-94	140	900	24.8	7.45	7.72	88.4	85.5	286	0.00	0.00	0.043	0.00067
12-30-94	141	1000	24.6	7.41	7.76							
12-31-94	142	1000	24.7	7.32	7.72							
01-01-95	143	1100	25.1	7.44	7.65							
01-02-95	144	1000	25.0	7.47	7.70							
01-03-95	145	1100	24.6	7.40	8.27							
01-04-95	146	900	24.7	7.47	7.78							
01-05-95	147	1100	24.2	7.46	8.77	88.4	68.4	289	0.00	0.00	0.030	0.00046
01-06-95	148	1000	23.3	7.48	8.60							
01-07-95	149	1130	23.9	7.45	9.26							
01-08-95	150	1030	23.7	7.56	9.06							
01-09-95	151	1000	23.4	7.41	9.49							
01-10-95	152	1000	24.1	7.49	7.97							
01-11-95	153	1000	24.4	7.48	7.19							
01-12-95	154	1100	24.4	7.43	7.16	102.0	102.6	300	0.00	0.00	0.027	0.00039
01-13-95	155	1000	24.5	7.47	6.76							
01-14-95	156	900	24.7	7.46	7.59							
01-15-95	157	800	25.2	7.40	7.69							
01-16-95	158	1030	25.0	7.43	7.70							
01-17-95	159	1000	24.6	7.42	8.09							
01-18-95	160	1000	24.6	7.50	7.24							
01-19-95	161	1000	24.7	7.74	7.47	88.4	85.5	286	0.00	0.00	a	a
01-20-95	162	1000	25.0	7.45	7.44							
01-21-95	163	1000	25.2	7.42	7.18							
01-22-95	164	1100	25.0	7.53	7.18							

01-23-95	165	600	24.7	7.58	7.80							
01-24-95	166	1000	24.7	7.48	8.45							
01-25-95	167	1100	22.7	7.43	7.53							
01-26-95	168	1100	23.3	7.45	7.45	88.4	85.5	291	0.00	0.00	0.011	0.00015
01-27-95	169	1000	23.2	7.40	7.76							
01-28-95	170	830	24.2	7.49	7.56							
01-29-95	171	900	23.9	7.38	8.05							
01-30-95	172	1000	24.3	7.32	7.73							
01-31-95	173	1000	22.9	7.40	8.25							
02-01-95	174	1000	25.4	7.36	7.37							
02-02-95	175	900	25.7	7.47	7.83	95.2	85.5	292	0.00	0.00	0.025	0.00043
02-03-95	176	930	25.2	7.43	7.80							
02-04-95	177	1000	25.4	7.38	8.02							
02-05-95	178	1200	24.4	7.16	7.92							
02-06-95	179	930	21.7	7.36	8.83							
02-07-95	180	900	22.9	7.38	8.55							
02-08-95	181	900	22.9	7.17	8.43							
02-09-95	182	900	21.3	7.20	9.22	40.8	85.5	255	0.00	0.00	0.014	0.00010
02-10-95	183	900	22.3	7.07	8.82							
02-11-95	184	900	21.4	7.03	9.34							
02-12-95	185	1200	21.1	6.92	9.63							
02-13-95	186	900	20.3	6.94	9.79							
02-14-95	187	900	20.2	7.03	9.61							
02-15-95	188	900	20.9	6.99	9.56							
02-16-95	189	900	21.2	6.99	9.52	34.0	85.5	252	0.00	0.00	0.025	0.00011
02-17-95	190	900	20.6	6.99	9.43							
02-18-95	191	1100	20.5	7.01	9.97							
02-19-95	192	1400	21.4	6.90	9.76							
02-20-95	193	1000	20.8	6.92	9.42							
02-21-95	194	1000	21.0	7.00	9.43							
02-22-95	195	900	20.9	7.04	9.15							
02-23-95	196	1000	21.9	7.01	9.11	34.0	85.5	254	0.00	0.00	0.034	0.00020
02-24-95	197	1000	21.6	7.02	8.95							
02-25-95	198	1000	21.0	7.06	9.10							
02-26-95	199	1800	21.5	7.11	9.28							
02-27-95	200	900	21.3	7.01	9.10							
02-28-95	201	900	22.2	7.02	8.97							
03-01-95	202	900	22.2	6.94	9.00							
03-02-95	203	900	21.6	7.03	9.15	34.0	85.5	349	0.00	0.00	0.012	0.00006
03-03-95	204	900	21.2	7.04	9.08							
03-04-95	205	1000	22.3	7.02	8.95							
03-05-95	206	1015	22.5	7.05	8.92							
03-06-95	207	900	22.6	6.96	8.86							
03-07-95	208	900	23.3	6.99	8.67							

03-08-95	209	900	23.1	7.02	8.53							
03-09-95	210	1000	23.1	7.03	8.38	40.8	85.5	250	0.00	0.00	0.015	0.00003
03-10-95	211	900	25.0	6.94	8.20							
03-11-95	212	1100	24.2	6.96	8.48							
03-12-95	213	1800	24.9	6.99	8.13							
03-13-95	214	900	24.0	6.97	8.37							
03-14-95	215	900	24.2	6.94	8.48							
03-15-95	216	900	24.2	7.05	8.43							
03-16-95	217	900	24.6	6.90	8.53	47.6	85.5	223	0.00	0.00	0.010	0.00004
03-17-95	218	900	24.9	7.02	8.28							
03-18-95	219	1000	24.5	6.94	8.07							
03-19-95	220	1600	25.5	6.98	8.17							
03-20-95	221	900	24.8	7.01	8.23							
03-21-95	222	900	25.0	7.03	7.84							
03-22-95	223	900	24.9	7.00	8.16							
03-23-95	224	1100	25.0	6.95	7.94	47.6	85.5	233	0.00	0.00	a	a
03-24-95	225	900	24.8	7.03	7.31							
03-25-95	226	915	25.8	7.06	7.68							
03-26-95	227	900	25.7	7.06	8.29							
03-27-95	228	900	25.8	6.96	7.93							
03-28-95	229	900	24.8	6.96	7.50							
03-29-95	230	900	24.7	6.99	7.79							
03-30-95	231	900	24.4	6.93	7.55	47.6	85.5	228	0.00	0.00	0.055	0.00021
03-31-95	232	900	24.9	6.95	7.36							
04-01-95	233	900	24.5	7.04	7.71							
04-02-95	234	1000	24.6	7.08	8.02							
04-03-95	235	900	24.4	7.01	7.85							
04-04-95	236	900	25.1	7.11	7.35							
04-05-95	237	900	24.5	7.01	7.34							
04-06-95	238	900	24.7	7.01	7.51	40.8	85.5	239	0.00	0.00	0.058	0.00023
04-07-95	239	900	25.0	7.00	7.21							
04-08-95	240	1100	25.2	6.99	7.54							
04-09-95	241	1300	25.5	7.01	7.91							
04-10-95	242	900	24.9	6.99	7.15							
04-11-95	243	900	25.3	7.00	7.27							
04-12-95	244	900	25.4	7.02	7.21							
04-13-95	245	1100	25.5	7.05	7.21	40.8	85.5	257	0.00	0.00	0.032	0.00015
04-14-95	246	900	25.1	6.95	6.77							
04-15-95	247	1400	25.5	7.05	7.44							
04-16-95	248	1100	25.3	6.95	7.58							
04-17-95	249	900	25.1	7.03	7.36							
04-18-95	250	900	25.0	6.99	7.71							
04-19-95	251	900	25.7	7.00	7.64							
04-20-95	252	900	25.1	7.00	7.56	40.8	68.4	230	0.00	0.00	a	a

04-21-95	253	900	25.3	7.02	7.33							
04-22-95	254	1200	25.8	7.00	7.30							
04-23-95	255	2000	25.4	7.00	7.59							
04-24-95	256	900	24.9	7.00	7.21							
04-25-95	257	900	25.0	7.00	7.16							
04-26-95	258	900	24.7	7.04	7.06							
04-27-95	259	900	25.1	7.01	7.09	40.8	85.5	231	0.00	0.00	a	a
04-28-95	260	900	25.3	7.02	7.15							
04-29-95	261	1100	25.3	7.02	6.83							
04-30-95	262	1600	25.3	7.03	7.55							
05-01-95	263	900	25.2	7.00	7.89							
05-02-95	264	900	25.1	6.99	8.37							
05-03-95	265	900	24.8	7.03	7.50							
05-04-95	266	900	24.9	6.98	7.75	40.8	85.5	234	0.00	0.00	a	a
05-05-95	267	900	25.3	7.00	7.64							
05-06-95	268	830	25.1	7.01	7.30							
05-07-95	269	900	25.2	6.96	7.11							
05-08-95	270	900	25.1	6.99	7.39							
05-09-95	271	900	25.1	6.99	7.13							
05-10-95	272	900	25.7	6.98	7.21							
MEAN			24.3		8.25	51.7	84.2	243			0.040	0.00031
MINIMUM			20.2	6.76	6.76	27.2	68.4	188	0.00	0.00	0.000	0.00000
MAXIMUM			26.5	7.74	9.97	102.0	102.6	349	0.00	0.00	0.146	0.00114
Std Dev			1.24		0.665	21.42	7.21	33.8			0.0313	0.000284
N			272	271	272	38	38	38	38	38	29	29

[a]Data not available; analytical instrument would not calibrate.

TANK No. 26
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.8	7.22	8.98							
08-13-94	2	900	25.1	7.22	7.70							
08-14-94	3	900	25.2	7.28	7.90							
08-15-94	4	900	25.0	7.12	7.96							
08-16-94	5	1000	25.1	7.09	7.61							
08-17-94	6	1000	25.0	7.08	7.19							
08-18-94	7	900	25.1	7.00	7.12	40.8	85.5	212	0.00	0.00	0.115	0.00066
08-19-94	8	800	24.9	6.94	8.23							
08-20-94	9	1000	25.0	6.97	8.20							
08-21-94	10	800	25.0	7.05	8.10							
08-22-94	11	900	25.0	7.10	8.11							
08-23-94	12	730	24.7	7.01	8.12							
08-24-94	13	1000	24.7	6.96	8.36							
08-25-94	14	1100	24.7	7.02	8.60	34.0	85.5	217	0.00	0.00	0.098	0.00057
08-26-94	15	900	24.8	7.05	8.28							
08-27-94	16	900	24.8	7.06	8.21							
08-28-94	17	800	24.8	7.03	8.15							
08-29-94	18	900	25.2	7.05	8.10							
08-30-94	19	900	24.6	7.07	8.16							
08-31-94	20	800	24.8	7.10	8.26							
09-01-94	21	1100	24.9	7.10	8.85	40.8	102.6	229	0.00	0.00	a	a
09-02-94	22	900	24.6	7.10	8.61							
09-03-94	23	815	24.4	7.20	8.18							
09-04-94	24	810	24.4	7.24	8.27							
09-05-94	25	1100	24.4	7.06	8.87							
09-06-94	26	900	24.2	7.06	8.82							
09-07-94	27	800	24.3	7.10	8.88							
09-08-94	28	1100	24.1	7.13	9.14	40.8	85.5	224	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.3	7.01	9.71							
09-10-94	30	900	24.3	7.17	9.12							
09-11-94	31	800	23.9	7.06	8.69							
09-12-94	32	500	23.9	7.08	8.30							

09-13-94	33	700	24.1	7.05	9.02							
09-14-94	34	1400	24.7	7.09	8.58							
09-15-94	35	1300	24.7	7.05	8.28							
09-16-94	36	1200	24.7	7.04	8.41	40.8	85.5	222	0.00	0.00	0.005	0.00003
09-17-94	37	820	24.8	7.12	8.24							
09-18-94	38	830	24.8	7.12	8.45							
09-19-94	39	1000	24.4	6.98	8.52							
09-20-94	40	1000	24.5	7.01	8.63							
09-21-94	41	1000	24.7	7.02	8.43							
09-22-94	42	900	24.8	7.08	8.39	40.8	85.5	226	0.00	0.00	a	a
09-23-94	43	1000	24.8	7.11	8.70							
09-24-94	44	845	24.7	7.13	8.37							
09-25-94	45	1300	24.8	a	8.61							
09-26-94	46	900	24.7	6.90	8.18							
09-27-94	47	800	24.7	6.94	8.71							
09-28-94	48	1000	24.6	6.76	7.96	34.0	68.4	195	a	a	a	a
09-29-94	49	1030	24.7	7.17	7.90							
09-30-94	50	1030	24.3	7.15	8.75							
10-01-94	51	900	24.2	7.09	8.02							
10-02-94	52	915	24.5	7.06	8.95							
10-03-94	53	1100	24.0	7.01	8.96							
10-04-94	54	1100	23.9	7.01	8.79							
10-05-94	55	1000	24.3	7.00	9.00							
10-06-94	56	800	24.0	7.02	8.37	34.0	85.5	214	0.00	0.00	a	a
10-07-94	57	1100	24.4	7.01	9.02						0.025	0.00014
10-08-94	58	1100	24.5	6.98	9.28							
10-09-94	59	1100	24.6	7.00	8.66							
10-10-94	60	1000	24.2	7.03	8.35							
10-11-94	61	1600	24.5	7.04	8.04							
10-12-94	62	900	23.8	7.05	8.67							
10-13-94	63	1300	24.5	7.01	8.28	34.0	85.5	220	0.00	0.00	a	a
10-14-94	64	1300	25.7	6.97	7.24							
10-15-94	65	900	25.2	7.04	7.75							
10-16-94	66	900	24.7	7.08	8.00							
10-17-94	67	1000	24.7	7.08	8.39							
10-18-94	68	800	24.5	6.92	7.76							
10-19-94	69	900	24.7	7.13	8.21							
10-20-94	70	900	24.3	7.00	8.03	40.8	85.5	219	0.00	0.00	0.021	0.00011
10-21-94	71	900	22.4	7.07	9.22							
10-22-94	72	800	24.0	7.13	8.55							
10-23-94	73	900	24.5	7.07	8.83							
10-24-94	74	900	24.3	7.08	8.42							
10-25-94	75	900	24.4	7.08	8.34							
10-26-94	76	800	24.2	7.11	8.45							

10-27-94	77	1100	24.8	7.10	8.65	40.8	85.5	212	0.00	0.00	0.020	0.00014
10-28-94	78	1000	24.6	7.12	8.76							
10-29-94	79	900	24.5	7.12	8.06							
10-30-94	80	900	24.8	7.12	8.81							
10-31-94	81	1000	24.9	7.07	9.21							
11-01-94	82	1100	25.3	7.05	8.95							
11-02-94	83	1000	24.9	7.08	8.95							
11-03-94	84	1000	24.7	7.06	8.00							
11-04-94	85	1000	25.0	7.00	8.13	40.8	85.5	224	0.00	0.00	0.061	0.00035
11-05-94	86	1000	25.0	7.20	9.23							
11-06-94	87	1000	25.2	7.03	8.88							
11-07-94	88	700	24.7	7.10	9.18							
11-08-94	89	1000	24.7	7.03	9.07							
11-09-94	90	1000	24.9	7.04	8.97							
11-10-94	91	1100	24.8	7.06	7.99							
11-11-94	92	900	24.4	7.03	8.25	40.8	85.5	227	0.00	0.00	0.049	0.00028
11-12-94	93	845	24.1	7.15	7.95							
11-13-94	94	830	24.4	7.15	8.43							
11-14-94	95	1000	24.5	7.03	8.70							
11-15-94	96	900	24.7	7.03	8.79							
11-16-94	97	900	24.6	7.08	8.28	40.8	85.5	211	0.00	0.00	0.038	0.00025
11-17-94	98	900	24.8	7.09	8.44							
11-18-94	99	900	25.0	7.04	8.23							
11-19-94	100	800	24.8	7.09	8.25							
11-20-94	101	900	24.7	7.07	8.48							
11-21-94	102	600	24.6	7.10	8.59							
11-22-94	103	600	24.9	7.10	8.41							
11-23-94	104	800	22.1	7.24	8.96	47.6	85.5	206	0.00	0.00	0.039	0.00031
11-24-94	105	730	22.4	7.04	8.31							
11-25-94	106	1020	22.1	7.04	9.69							
11-26-94	107	1000	22.1	6.98	8.80							
11-27-94	108	900	21.4	6.93	9.07							
11-28-94	109	900	22.1	6.93	9.08							
11-29-94	110	900	21.4	6.78	9.14							
11-30-94	111	900	21.4	6.77	8.97							
12-01-94	112	900	21.0	6.77	8.94	27.2	85.5	188	0.00	0.00	0.044	0.00011
12-02-94	113	1000	26.4	7.00	8.40							
12-03-94	114	1000	24.8	6.99	8.00							
12-04-94	115	1100	25.2	6.88	8.30							
12-05-94	116	900	25.0	6.92	7.99							
12-06-94	117	900	24.9	7.35	8.03							
12-07-94	118	900	24.9	7.37	8.86							
12-08-94	119	1100	25.0	7.32	7.86	88.4	68.4	278	0.00	0.00	0.041	0.00048
12-09-94	120	1000	24.8	7.42	7.76							

12-10-94	121	1300	25.2	7.39	7.56							
12-11-94	122	900	25.1	7.40	7.79							
12-12-94	123	900	24.2	7.38	8.38							
12-13-94	124	900	24.0	7.42	8.54							
12-14-94	125	900	23.8	7.44	8.60							
12-15-94	126	800	24.8	7.44	8.37	81.6	68.4	270	0.00	0.00	0.063	0.00096
12-16-94	127	1100	24.8	7.40	8.01							
12-17-94	128	845	25.3	7.51	7.57							
12-18-94	129	930	25.2	7.45	7.39							
12-19-94	130	1000	25.2	7.31	7.55							
12-20-94	131	1100	25.0	7.38	7.91							
12-21-94	132	1000	24.9	7.31	7.85	81.6	85.5	265	0.00	0.00	0.100	0.00114
12-22-94	133	800	24.7	7.46	7.79							
12-23-94	134	1000	24.9	7.32	7.67							
12-24-94	135	900	25.0	7.47	7.84							
12-25-94	136	700	23.9	7.61	8.33							
12-26-94	137	1000	24.1	7.32	8.15							
12-27-94	138	1100	24.6	7.48	8.00							
12-28-94	139	1000	24.7	7.44	8.47							
12-29-94	140	900	24.7	7.45	7.71	88.4	85.5	285	0.00	0.00	0.044	0.00068
12-30-94	141	1000	24.6	7.41	7.74							
12-31-94	142	1000	24.5	7.32	7.76							
01-01-95	143	1100	24.9	7.44	7.72							
01-02-95	144	1000	24.9	7.47	7.71							
01-03-95	145	1100	24.6	7.40	8.21							
01-04-95	146	900	24.6	7.47	7.77							
01-05-95	147	1100	24.1	7.46	8.83	88.4	68.4	288	0.00	0.00	0.028	0.00043
01-06-95	148	1000	23.3	7.46	8.51							
01-07-95	149	1130	23.7	7.42	9.13							
01-08-95	150	1030	23.6	7.54	9.15							
01-09-95	151	1000	23.4	7.41	9.42							
01-10-95	152	1000	24.0	7.49	7.93							
01-11-95	153	1000	24.1	7.48	7.53							
01-12-95	154	1100	24.4	7.43	7.45	95.2	102.6	300	0.00	0.00	0.030	0.00044
01-13-95	155	1000	24.4	7.47	6.80							
01-14-95	156	900	24.8	7.46	7.59							
01-15-95	157	800	25.2	7.40	7.65							
01-16-95	158	1030	25.1	7.43	7.65							
01-17-95	159	1000	24.6	7.42	8.06							
01-18-95	160	1000	24.7	7.50	7.16							
01-19-95	161	1000	24.8	7.74	7.45	81.6	85.5	286	0.00	0.00	a	a
01-20-95	162	1000	25.0	7.45	7.35							
01-21-95	163	1000	25.2	7.42	7.10							
01-22-95	164	1100	25.0	7.53	7.12							

01-23-95	165	600	24.7	7.58	7.76							
01-24-95	166	1000	24.8	7.48	8.22							
01-25-95	167	1100	22.8	7.43	7.34							
01-26-95	168	1100	23.3	7.45	7.38	88.4	85.5	292	0.00	0.00	0.009	0.00013
01-27-95	169	1000	23.2	7.40	7.46							
01-28-95	170	830	24.5	7.50	7.33							
01-29-95	171	900	24.0	7.38	8.07							
01-30-95	172	1000	24.4	7.32	7.53							
01-31-95	173	1000	23.0	7.40	7.99							
02-01-95	174	1000	25.5	7.36	7.23							
02-02-95	175	900	25.7	7.47	7.66	95.2	85.5	292	0.00	0.00	0.025	0.00043
02-03-95	176	930	25.2	7.43	7.60							
02-04-95	177	1000	25.4	7.38	7.75							
02-05-95	178	1200	24.4	7.16	7.82							
02-06-95	179	930	21.9	7.36	8.64							
02-07-95	180	900	23.1	7.38	8.27							
02-08-95	181	900	23.1	7.17	8.11							
02-09-95	182	900	21.5	7.20	9.07	40.8	85.5	255	0.00	0.00	0.014	0.00010
02-10-95	183	900	22.4	7.07	8.47							
02-11-95	184	900	21.5	7.03	9.14							
02-12-95	185	1200	21.2	6.92	9.42							
02-13-95	186	900	20.4	6.94	9.60							
02-14-95	187	900	20.3	7.03	9.44							
02-15-95	188	900	20.9	6.99	9.43							
02-16-95	189	900	21.2	6.99	9.42	34.0	85.5	251	0.00	0.00	0.025	0.00011
02-17-95	190	900	20.6	6.99	9.39							
02-18-95	191	1100	20.3	7.01	9.98							
02-19-95	192	1400	21.3	6.90	9.71							
02-20-95	193	1000	20.8	6.92	9.41							
02-21-95	194	1000	21.0	7.00	9.33							
02-22-95	195	900	20.9	7.04	9.13							
02-23-95	196	1000	22.0	7.01	9.08	34.0	85.5	254	0.00	0.00	0.034	0.00020
02-24-95	197	1000	21.6	7.02	8.88							
02-25-95	198	1000	20.9	7.06	9.09							
02-26-95	199	1800	21.5	7.11	9.26							
02-27-95	200	900	21.3	7.01	9.00							
02-28-95	201	900	22.1	7.02	8.89							
03-01-95	202	900	22.1	6.94	8.90							
03-02-95	203	900	21.6	7.03	8.97	34.0	85.5	348	0.00	0.00	0.013	0.00006
03-03-95	204	900	21.2	7.04	8.90							
03-04-95	205	1000	22.4	7.02	8.79							
03-05-95	206	1015	22.6	7.04	8.73							
03-06-95	207	900	22.6	6.96	8.72							
03-07-95	208	900	23.2	6.99	8.49							

03-08-95	209	900	23.0	7.02	8.35							
03-09-95	210	1000	23.3	7.03	8.22	40.8	85.5	249	0.00	0.00	0.015	0.00008
03-10-95	211	900	24.8	6.94	8.03							
03-11-95	212	1100	24.0	6.96	8.28							
03-12-95	213	1800	24.8	6.99	8.01							
03-13-95	214	900	24.0	6.97	8.12							
03-14-95	215	900	24.2	6.94	8.45							
03-15-95	216	900	24.1	7.05	8.36							
03-16-95	217	900	24.7	6.90	8.49	47.6	85.5	223	0.00	0.00	0.010	0.00004
03-17-95	218	900	24.8	7.02	8.28							
03-18-95	219	1000	24.5	6.94	8.08							
03-19-95	220	1600	25.5	6.98	8.10							
03-20-95	221	900	24.7	7.01	8.20							
03-21-95	222	900	25.0	7.03	7.86							
03-22-95	223	900	24.9	7.00	8.17							
03-23-95	224	1100	24.9	6.95	7.94	47.6	85.5	233	0.00	0.00	a	a
03-24-95	225	900	24.6	7.03	7.25							
03-25-95	226	915	25.5	7.06	7.67							
03-26-95	227	900	25.3	7.09	8.37							
03-27-95	228	900	25.4	6.96	7.75							
03-28-95	229	900	24.5	6.96	7.40							
03-29-95	230	900	24.4	6.99	7.41							
03-30-95	231	900	24.3	6.93	7.32	47.6	85.5	228	0.00	0.00	0.055	0.00021
03-31-95	232	900	24.7	6.95	7.06							
04-01-95	233	900	24.1	7.04	7.68							
04-02-95	234	1000	24.4	7.09	8.17							
04-03-95	235	900	24.0	7.01	7.95							
04-04-95	236	900	24.8	7.11	7.41							
04-05-95	237	900	24.3	7.01	7.14							
04-06-95	238	900	24.4	7.01	7.52	40.8	85.5	239	0.00	0.00	0.059	0.00023
04-07-95	239	900	24.7	7.00	7.19							
04-08-95	240	1100	24.9	6.99	7.46							
04-09-95	241	1300	25.3	7.01	7.80							
04-10-95	242	900	24.8	6.99	6.88							
04-11-95	243	900	24.9	7.00	7.18							
04-12-95	244	900	25.1	7.02	7.11							
04-13-95	245	1100	25.2	7.05	7.09	40.8	85.5	256	0.00	0.00	0.033	0.00016
04-14-95	246	900	24.8	6.95	6.75							
04-15-95	247	1400	25.3	7.05	7.39							
04-16-95	248	1100	25.1	6.95	7.44							
04-17-95	249	900	24.9	7.03	7.23							
04-18-95	250	900	24.8	6.99	7.47							
04-19-95	251	900	25.3	7.00	7.53							
04-20-95	252	900	24.9	7.00	7.45	40.8	68.4	229	0.00	0.00	a	a

04-21-95	253	900	25.2	7.02	7.18							
04-22-95	254	1200	25.7	7.00	7.10							
04-23-95	255	2000	25.2	7.00	7.31							
04-24-95	256	900	24.7	7.00	7.11							
04-25-95	257	900	24.8	7.00	6.95							
04-26-95	258	900	24.5	7.04	6.78							
04-27-95	259	900	24.9	7.01	6.97	40.8	85.5	231	0.00	0.00	a	a
04-28-95	260	900	25.1	7.02	6.85							
04-29-95	261	1100	25.1	7.02	6.73							
04-30-95	262	1600	25.1	7.03	7.42							
05-01-95	263	900	25.0	7.00	7.51							
05-02-95	264	900	25.0	6.99	8.09							
05-03-95	265	900	24.7	7.03	7.35							
05-04-95	266	900	24.8	6.98	7.55	40.8	85.5	233	0.00	0.00	a	a
05-05-95	267	900	25.2	7.00	7.33							
05-06-95	268	830	25.1	7.00	7.37							
05-07-95	269	900	25.1	6.98	7.10							
05-08-95	270	900	25.1	6.99	7.29							
05-09-95	271	900	25.0	6.99	6.95							
05-10-95	272	900	25.6	6.98	7.01							
MEAN			24.2		8.19	51.0	84.2	243			0.038	0.00030
MINIMUM			20.3	6.76	6.73	27.2	68.4	188	0.00	0.00	0.000	0.00000
MAXIMUM			26.4	7.74	9.98	95.2	102.6	348	0.00	0.00	0.115	0.00114
Std Dev			1.20		0.686	20.97	7.21	33.7			0.0280	0.000275
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 27
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.8	7.25	8.98							
08-13-94	2	900	25.1	7.19	7.67							
08-14-94	3	900	25.2	7.29	7.78							
08-15-94	4	900	24.9	7.15	8.12							
08-16-94	5	1000	25.0	7.13	7.62							
08-17-94	6	1000	25.0	7.13	7.45							
08-18-94	7	900	25.0	7.05	7.38	40.8	85.5	211	0.00	0.00	0.285	0.00181
08-19-94	8	800	24.8	6.95	8.23							
08-20-94	9	1000	24.9	7.00	8.18							
08-21-94	10	800	25.0	7.07	8.09							
08-22-94	11	900	25.0	7.13	8.11							
08-23-94	12	730	24.7	7.03	8.13							
08-24-94	13	1000	24.7	6.99	8.32							
08-25-94	14	1100	24.7	7.07	8.62	34.0	85.5	217	0.00	0.00	0.110	0.00071
08-26-94	15	900	24.8	7.07	8.30							
08-27-94	16	900	24.7	7.08	8.22							
08-28-94	17	800	24.8	7.06	8.19							
08-29-94	18	900	25.2	7.09	8.15							
08-30-94	19	900	24.6	7.11	8.26							
08-31-94	20	800	24.7	7.15	8.26							
09-01-94	21	1100	24.9	7.13	8.85	40.8	85.5	229	0.00	0.00	a	a
09-02-94	22	900	24.6	7.13	8.77							
09-03-94	23	815	24.4	7.22	8.09							
09-04-94	24	810	24.4	7.25	8.18							
09-05-94	25	1100	24.4	7.08	8.86							
09-06-94	26	900	24.2	7.08	8.85							
09-07-94	27	800	24.2	7.12	8.89							
09-08-94	28	1100	24.1	7.14	9.14	40.8	85.5	223	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.2	7.06	9.73							
09-10-94	30	900	24.3	7.20	9.12							
09-11-94	31	800	23.8	7.10	8.74							
09-12-94	32	500	23.9	7.13	8.32							

09-13-94	33	700	24.1	7.09	9.04							
09-14-94	34	1400	24.7	7.12	8.58							
09-15-94	35	1300	24.7	7.09	8.38							
09-16-94	36	1200	24.7	7.09	8.46	40.8	85.5	221	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.8	7.16	8.13							
09-18-94	38	830	24.8	7.16	8.29							
09-19-94	39	1000	24.4	7.03	8.45							
09-20-94	40	1000	24.5	7.07	8.64							
09-21-94	41	1000	24.7	7.08	8.58							
09-22-94	42	900	24.8	7.09	8.38	40.8	85.5	226	0.00	0.00	a	a
09-23-94	43	1000	24.8	7.11	8.88							
09-24-94	44	845	24.7	7.10	8.29							
09-25-94	45	1300	24.8	a	8.58							
09-26-94	46	900	24.7	6.94	8.18							
09-27-94	47	800	24.8	6.94	8.72							
09-28-94	48	1000	24.6	6.76	8.03	34.0	68.4	194	a	a	a	a
09-29-94	49	1030	24.6	7.17	7.81							
09-30-94	50	1030	24.3	7.14	8.63							
10-01-94	51	900	24.3	7.10	7.93							
10-02-94	52	915	24.5	7.12	8.24							
10-03-94	53	1100	24.0	7.01	8.99							
10-04-94	54	1100	24.1	7.01	8.78							
10-05-94	55	1000	24.4	7.00	8.98							
10-06-94	56	800	24.1	7.02	8.34	40.8	85.5	213	0.00	0.00	a	a
10-07-94	57	1100	24.4	7.01	9.04						0.030	0.00017
10-08-94	58	1100	24.6	6.98	9.28							
10-09-94	59	1100	24.7	7.00	8.66							
10-10-94	60	1000	24.3	7.03	8.38							
10-11-94	61	1600	24.6	7.04	8.07							
10-12-94	62	900	24.0	7.08	8.72							
10-13-94	63	1300	24.6	7.01	8.38	40.8	85.5	219	0.00	0.00	a	a
10-14-94	64	1300	25.8	6.97	7.37							
10-15-94	65	900	25.2	7.04	7.85							
10-16-94	66	900	24.7	7.08	8.04							
10-17-94	67	1000	24.7	7.08	8.37							
10-18-94	68	800	24.6	6.92	7.82							
10-19-94	69	900	24.8	7.13	8.24							
10-20-94	70	900	24.3	7.00	8.05	40.8	85.5	220	0.00	0.00	0.025	0.00013
10-21-94	71	900	22.4	7.07	9.25							
10-22-94	72	800	24.1	7.13	8.54							
10-23-94	73	900	24.5	7.07	8.85							
10-24-94	74	900	24.3	7.08	8.48							
10-25-94	75	900	24.4	7.08	8.30							
10-26-94	76	800	24.2	7.10	8.47							

10-27-94	77	1100	24.9	7.10	8.60	40.8	85.5	213	0.00	0.00	0.024	0.00017
10-28-94	78	1000	24.7	7.12	8.68							
10-29-94	79	900	24.6	7.10	8.00							
10-30-94	80	900	25.0	7.12	8.82							
10-31-94	81	1000	25.0	7.07	9.15							
11-01-94	82	1100	25.4	7.05	8.94							
11-02-94	83	1000	25.0	7.08	8.94							
11-03-94	84	1000	24.8	7.06	7.97							
11-04-94	85	1000	25.1	7.00	8.16	40.8	85.5	224	0.00	0.00	0.048	0.00027
11-05-94	86	1000	25.0	7.20	9.25							
11-06-94	87	1000	25.2	7.03	8.92							
11-07-94	88	700	24.9	7.10	9.17							
11-08-94	89	1000	24.8	7.03	9.16							
11-09-94	90	1000	24.9	7.04	9.07							
11-10-94	91	1100	24.9	7.06	8.05							
11-11-94	92	900	24.5	7.03	8.30	40.8	85.5	227	0.00	0.00	0.052	0.00030
11-12-94	93	845	24.2	7.14	7.84							
11-13-94	94	830	24.5	7.15	8.36							
11-14-94	95	1000	24.5	7.03	8.64							
11-15-94	96	900	24.8	7.03	8.73							
11-16-94	97	900	24.7	7.08	8.19	40.8	85.5	212	0.00	0.00	0.032	0.00021
11-17-94	98	900	24.9	7.09	8.35							
11-18-94	99	900	25.1	7.04	8.21							
11-19-94	100	800	24.9	7.09	8.21							
11-20-94	101	900	24.8	7.07	8.47							
11-21-94	102	600	24.8	7.10	8.52							
11-22-94	103	600	25.0	7.10	8.34							
11-23-94	104	800	22.1	7.24	8.93	47.6	85.5	206	0.00	0.00	0.042	0.00033
11-24-94	105	730	22.5	7.04	8.19							
11-25-94	106	1020	22.1	7.01	9.71							
11-26-94	107	1000	22.2	6.98	8.77							
11-27-94	108	900	21.4	6.93	9.02							
11-28-94	109	900	22.1	6.93	9.03							
11-29-94	110	900	21.4	6.78	9.10							
11-30-94	111	900	21.4	6.77	8.94							
12-01-94	112	900	21.1	6.77	8.89	27.2	85.5	189	0.00	0.00	0.042	0.00011
12-02-94	113	1000	26.5	7.01	8.41							
12-03-94	114	1000	25.1	6.92	7.93							
12-04-94	115	1100	25.4	6.87	8.30							
12-05-94	116	900	25.1	6.92	8.00							
12-06-94	117	900	25.1	7.33	8.00							
12-07-94	118	800	25.1	7.37	8.78							
12-08-94	119	1100	25.2	7.32	7.93	88.4	68.4	278	0.00	0.00	0.035	0.00042
12-09-94	120	1000	24.9	7.42	7.79							

12-10-94	121	1300	25.3	7.39	7.57							
12-11-94	122	900	25.3	7.37	7.80							
12-12-94	123	900	24.5	7.38	8.34							
12-13-94	124	900	24.3	7.42	8.54							
12-14-94	125	900	24.1	7.44	8.54							
12-15-94	126	800	24.8	7.42	8.46	81.6	68.4	270	0.00	0.00	0.057	0.00083
12-16-94	127	1100	24.8	7.40	8.14							
12-17-94	128	845	25.2	7.50	7.65							
12-18-94	129	930	25.0	7.45	7.46							
12-19-94	130	1000	25.2	7.31	7.66							
12-20-94	131	1100	25.0	7.38	8.06							
12-21-94	132	1000	24.8	7.31	8.06	81.6	68.4	264	0.00	0.00	0.100	0.00113
12-22-94	133	800	24.7	7.46	7.90							
12-23-94	134	1000	24.8	7.32	7.90							
12-24-94	135	900	24.8	7.47	8.10							
12-25-94	136	700	23.8	7.58	8.51							
12-26-94	137	1000	23.9	7.32	8.46							
12-27-94	138	1100	24.4	7.48	8.28							
12-28-94	139	1000	24.4	7.43	8.84							
12-29-94	140	900	24.6	7.45	8.01	88.4	85.5	284	0.00	0.00	0.042	0.00064
12-30-94	141	1000	24.4	7.41	8.03							
12-31-94	142	1000	24.4	7.32	8.08							
01-01-95	143	1100	24.7	7.42	8.00							
01-02-95	144	1000	24.7	7.47	8.00							
01-03-95	145	1100	24.4	7.40	8.57							
01-04-95	146	900	24.5	7.47	8.11							
01-05-95	147	1100	24.0	7.46	9.03	88.4	68.4	287	0.00	0.00	0.027	0.00041
01-06-95	148	1000	23.3	7.44	8.69							
01-07-95	149	1130	23.7	7.40	9.28							
01-08-95	150	1030	23.3	7.52	9.17							
01-09-95	151	1000	23.2	7.41	9.65							
01-10-95	152	1000	23.9	7.49	8.10							
01-11-95	153	1000	23.8	7.52	7.65							
01-12-95	154	1100	24.1	7.43	7.68	95.2	102.6	298	0.00	0.00	0.030	0.00043
01-13-95	155	1000	24.4	7.47	7.04							
01-14-95	156	900	24.7	7.46	7.68							
01-15-95	157	800	25.2	7.40	7.77							
01-16-95	158	1030	25.1	7.43	7.82							
01-17-95	159	1000	24.6	7.42	8.16							
01-18-95	160	1000	24.6	7.52	7.31							
01-19-95	161	1000	24.7	7.74	7.63	88.4	85.5	285	0.00	0.00	a	a
01-20-95	162	1000	24.9	7.45	7.44							
01-21-95	163	1000	25.2	7.42	7.19							
01-22-95	164	1100	25.0	7.53	7.15							

01-23-95	165	600	24.8	7.58	7.80							
01-24-95	166	1000	24.9	7.48	8.37							
01-25-95	167	1100	22.7	7.48	7.62							
01-26-95	168	1100	23.4	7.45	7.58	88.4	85.5	290	0.00	0.00	0.011	0.00016
01-27-95	169	1000	23.2	7.40	7.76							
01-28-95	170	830	24.4	7.51	7.58							
01-29-95	171	900	23.9	7.41	8.16							
01-30-95	172	1000	24.3	7.32	7.76							
01-31-95	173	1000	23.0	7.40	8.23							
02-01-95	174	1000	25.6	7.36	7.41							
02-02-95	175	900	25.8	7.47	7.86	88.4	85.5	291	0.00	0.00	0.025	0.00044
02-03-95	176	930	25.2	7.40	7.85							
02-04-95	177	1000	25.4	7.38	7.99							
02-05-95	178	1200	24.4	7.16	8.02							
02-06-95	179	930	21.7	7.36	8.85							
02-07-95	180	900	22.9	7.38	8.49							
02-08-95	181	900	23.0	7.17	8.40							
02-09-95	182	900	21.4	7.20	9.30	47.6	85.5	255	0.00	0.00	0.016	0.00011
02-10-95	183	900	22.3	7.07	8.70							
02-11-95	184	900	21.5	7.03	9.26							
02-12-95	185	1200	21.3	6.92	9.50							
02-13-95	186	900	20.3	6.94	9.74							
02-14-95	187	900	20.1	7.03	9.47							
02-15-95	188	900	21.0	6.99	9.65							
02-16-95	189	900	21.2	6.99	9.40	34.0	85.5	252	0.00	0.00	0.027	0.00011
02-17-95	190	900	20.6	6.99	9.31							
02-18-95	191	1100	20.7	7.01	9.75							
02-19-95	192	1400	21.6	6.90	9.54							
02-20-95	193	1000	20.8	6.92	9.31							
02-21-95	194	1000	21.3	7.00	9.25							
02-22-95	195	900	21.1	7.04	9.14							
02-23-95	196	1000	22.1	7.01	9.03	34.0	85.5	255	0.00	0.00	0.034	0.00020
02-24-95	197	1000	21.7	7.02	8.90							
02-25-95	198	1000	21.1	7.06	9.07							
02-26-95	199	1800	21.7	7.11	9.22							
02-27-95	200	900	21.5	7.01	8.92							
02-28-95	201	900	22.3	7.02	8.82							
03-01-95	202	900	22.5	6.94	8.81							
03-02-95	203	900	21.8	7.03	8.95	34.0	85.5	351	0.00	0.00	0.011	0.00005
03-03-95	204	900	21.6	7.04	8.87							
03-04-95	205	1000	22.6	7.02	8.68							
03-05-95	206	1015	22.8	7.03	8.68							
03-06-95	207	900	22.9	6.96	8.81							
03-07-95	208	900	23.5	6.99	8.60							

03-08-95	209	900	23.5	7.02	8.41							
03-09-95	210	1000	24.0	7.03	8.30	40.8	85.5	251	0.00	0.00	0.014	0.00008
03-10-95	211	900	25.3	6.94	8.12							
03-11-95	212	1100	24.7	6.96	8.12							
03-12-95	213	1800	25.5	6.99	8.04							
03-13-95	214	900	24.6	6.97	8.00							
03-14-95	215	900	24.9	6.94	8.37							
03-15-95	216	900	24.8	7.05	8.15							
03-16-95	217	900	25.5	6.90	8.30	47.6	85.5	225	0.00	0.00	0.010	0.00004
03-17-95	218	900	25.5	7.02	8.12							
03-18-95	219	1000	25.2	6.94	7.94							
03-19-95	220	1600	26.1	6.98	8.05							
03-20-95	221	900	25.5	7.01	8.09							
03-21-95	222	900	25.3	7.03	7.83							
03-22-95	223	900	25.7	7.00	8.00							
03-23-95	224	1100	25.6	6.95	7.84	47.6	85.5	234	0.00	0.00	a	a
03-24-95	225	900	25.5	7.03	6.86							
03-25-95	226	915	25.9	7.07	7.57							
03-26-95	227	900	25.6	7.04	8.21							
03-27-95	228	900	25.9	6.96	7.69							
03-28-95	229	900	25.0	6.96	7.49							
03-29-95	230	900	24.7	6.99	7.57							
03-30-95	231	900	24.3	6.93	7.44	47.6	85.5	228	0.00	0.00	0.056	0.00022
03-31-95	232	900	25.1	6.95	7.10							
04-01-95	233	900	24.6	7.05	7.54							
04-02-95	234	1000	24.8	7.05	7.95							
04-03-95	235	900	24.5	7.01	7.80							
04-04-95	236	900	25.1	7.11	7.54							
04-05-95	237	900	24.6	7.01	7.41							
04-06-95	238	900	24.9	7.01	7.55	40.8	85.5	239	0.00	0.00	0.061	0.00024
04-07-95	239	900	25.0	7.00	7.44							
04-08-95	240	1100	25.3	6.99	7.58							
04-09-95	241	1300	25.6	7.01	7.94							
04-10-95	242	900	25.1	6.99	7.08							
04-11-95	243	900	25.4	7.00	7.20							
04-12-95	244	900	25.6	7.02	7.20							
04-13-95	245	1100	25.6	7.05	7.07	40.8	85.5	257	0.00	0.00	0.032	0.00015
04-14-95	246	900	25.2	6.95	6.67							
04-15-95	247	1400	25.7	7.05	7.35							
04-16-95	248	1100	25.5	6.95	7.35							
04-17-95	249	900	25.3	7.03	6.91							
04-18-95	250	900	25.4	6.99	7.37							
04-19-95	251	900	25.9	7.00	7.35							
04-20-95	252	900	25.2	7.00	7.20	40.8	68.4	230	0.00	0.00	a	a

04-21-95	253	900	25.4	7.02	6.92							
04-22-95	254	1200	26.0	7.00	6.91							
04-23-95	255	2000	25.5	7.00	7.32							
04-24-95	256	900	25.1	7.00	6.80							
04-25-95	257	900	25.1	7.00	6.86							
04-26-95	258	900	24.9	7.04	6.73							
04-27-95	259	900	25.3	7.01	6.73	40.8	85.5	232	0.00	0.00	a	a
04-28-95	260	900	25.3	7.02	6.96							
04-29-95	261	1100	25.4	7.02	6.60							
04-30-95	262	1600	25.3	7.03	7.35							
05-01-95	263	900	25.2	7.00	7.57							
05-02-95	264	900	25.1	6.99	7.90							
05-03-95	265	900	25.0	7.03	7.11							
05-04-95	266	900	25.1	6.98	7.38	40.8	85.5	233	0.00	0.00	a	a
05-05-95	267	900	25.4	7.00	7.26							
05-06-95	268	830	25.1	7.03	7.22							
05-07-95	269	900	25.3	6.99	6.94							
05-08-95	270	900	25.4	6.99	7.17							
05-09-95	271	900	25.4	6.99	7.01							
05-10-95	272	900	25.8	6.98	7.18							
MEAN			24.3		8.21	51.5	83.3	243			0.044	0.00034
MINIMUM			20.1	6.76	6.60	27.2	68.4	189	0.00	0.00	0.000	0.00000
MAXIMUM			26.5	7.74	9.75	95.2	102.6	351	0.00	0.00	0.285	0.00181
Std Dev			1.24		0.681	20.62	6.99	33.6			0.0518	0.000378
N			272	271	272	38	38	38	38	38	29	29

a Data not available; analytical instrument would not calibrate.

TANK No. 28
TANK CONCENTRATION: 5% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.7	7.25	8.98							
08-13-94	2	900	25.0	7.19	7.90							
08-14-94	3	900	25.2	7.29	7.87							
08-15-94	4	900	24.9	7.15	8.15							
08-16-94	5	1000	25.0	7.13	7.77							
08-17-94	6	1000	25.0	7.12	7.05							
08-18-94	7	900	25.0	7.05	6.81	40.8	85.5	211	0.00	0.00	0.193	0.00122
08-19-94	8	800	24.8	6.95	8.20							
08-20-94	9	1000	24.8	7.00	8.18							
08-21-94	10	800	25.0	7.07	8.09							
08-22-94	11	900	24.9	7.13	8.10							
08-23-94	12	730	24.6	7.03	8.16							
08-24-94	13	1000	24.6	6.99	8.32							
08-25-94	14	1100	24.7	7.07	8.60	34.0	85.5	217	0.00	0.00	0.083	0.00054
08-26-94	15	900	24.7	7.07	8.26							
08-27-94	16	900	24.7	7.08	8.22							
08-28-94	17	800	24.8	7.06	8.14							
08-29-94	18	900	25.1	7.09	8.12							
08-30-94	19	900	24.5	7.11	8.21							
08-31-94	20	800	24.7	7.15	8.22							
09-01-94	21	1100	24.8	7.13	8.82	40.8	102.6	229	0.00	0.00	a	a
09-02-94	22	900	24.6	7.13	8.73							
09-03-94	23	815	24.4	7.22	8.13							
09-04-94	24	810	24.4	7.25	8.18							
09-05-94	25	1100	24.3	7.08	8.89							
09-06-94	26	900	24.1	7.08	8.86							
09-07-94	27	800	24.1	7.12	8.88							
09-08-94	28	1100	24.0	7.14	9.12	40.8	85.5	222	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.2	7.06	9.69							
09-10-94	30	900	24.2	7.20	9.12							
09-11-94	31	800	23.8	7.10	8.72							
09-12-94	32	500	23.9	7.13	8.29							

09-13-94	33	700	24.0	7.09	9.06							
09-14-94	34	1400	24.6	7.12	8.60							
09-15-94	35	1300	24.6	7.09	8.34							
09-16-94	36	1200	24.7	7.09	8.43	40.8	85.5	221	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.8	7.11	8.09							
09-18-94	38	830	24.8	7.13	8.36							
09-19-94	39	1000	24.4	7.03	8.49							
09-20-94	40	1000	24.4	7.07	8.67							
09-21-94	41	1000	24.6	7.08	8.58							
09-22-94	42	900	24.8	7.11	8.39	40.8	85.5	226	0.00	0.00	a	a
09-23-94	43	1000	24.7	7.13	8.95							
09-24-94	44	845	24.6	7.14	8.33							
09-25-94	45	1300	24.8	a	8.56							
09-26-94	46	900	24.6	6.94	8.23							
09-27-94	47	800	24.7	6.94	8.78							
09-28-94	48	1000	24.5	6.76	8.05	34.0	68.4	194	a	a	a	a
09-29-94	49	1030	24.6	7.17	7.84							
09-30-94	50	1030	24.3	7.14	8.69							
10-01-94	51	900	24.2	7.09	7.91							
10-02-94	52	915	24.4	7.09	8.81							
10-03-94	53	1100	23.9	7.01	8.97							
10-04-94	54	1100	24.0	7.01	8.79							
10-05-94	55	1000	24.3	7.00	9.07							
10-06-94	56	800	23.9	7.02	8.40	34.0	85.5	213	0.00	0.00	a	a
10-07-94	57	1100	24.4	7.01	9.01						0.024	0.00013
10-08-94	58	1100	24.5	6.98	9.30							
10-09-94	59	1100	24.5	7.00	8.70							
10-10-94	60	1000	24.1	7.03	8.36							
10-11-94	61	1600	24.5	7.04	8.10							
10-12-94	62	900	23.9	7.08	8.68							
10-13-94	63	1300	24.5	7.01	8.35	34.0	85.5	219	0.00	0.00	a	a
10-14-94	64	1300	25.7	6.97	7.28							
10-15-94	65	900	25.1	7.04	7.80							
10-16-94	66	900	24.7	7.08	8.03							
10-17-94	67	1000	24.7	7.08	8.33							
10-18-94	68	800	24.6	6.92	7.79							
10-19-94	69	900	24.7	7.13	8.21							
10-20-94	70	900	24.2	7.00	8.08	40.8	85.5	220	0.00	0.00	0.019	0.00010
10-21-94	71	900	22.3	7.07	9.30							
10-22-94	72	800	24.0	7.13	8.56							
10-23-94	73	900	24.4	7.07	8.86							
10-24-94	74	900	24.2	7.08	8.42							
10-25-94	75	900	24.3	7.08	8.27							
10-26-94	76	800	24.1	7.10	8.40							

10-27-94	77	1100	24.8	7.10	8.62	40.8	85.5	214	0.00	0.00	0.024	0.00017
10-28-94	78	1000	24.6	7.12	8.66							
10-29-94	79	900	24.6	7.10	7.98							
10-30-94	80	900	24.9	7.12	8.77							
10-31-94	81	1000	24.9	7.07	9.15							
11-01-94	82	1100	25.3	7.05	8.95							
11-02-94	83	1000	24.9	7.08	8.94							
11-03-94	84	1000	24.8	7.06	7.93							
11-04-94	85	10000	25.0	7.00	8.09	40.8	85.5	224	0.00	0.00	0.057	0.00032
11-05-94	86	1000	25.0	7.20	9.15							
11-06-94	87	1000	25.2	7.03	8.85							
11-07-94	88	700	24.8	7.10	9.11							
11-08-94	89	1000	24.7	7.03	9.11							
11-09-94	90	1000	24.8	7.04	8.98							
11-10-94	91	1100	24.8	7.06	7.99							
11-11-94	92	900	24.4	7.03	8.23	40.8	85.5	227	0.00	0.00	0.046	0.00027
11-12-94	93	845	24.1	7.12	7.81							
11-13-94	94	830	24.4	7.14	8.53							
11-14-94	95	1000	24.4	7.03	8.65							
11-15-94	96	900	24.7	7.03	8.74							
11-16-94	97	900	24.6	7.08	8.26	40.8	85.5	212	0.00	0.00	0.036	0.00024
11-17-94	98	900	24.8	7.09	8.35							
11-18-94	99	900	24.9	7.04	8.22							
11-19-94	100	800	24.9	7.09	8.19							
11-20-94	101	900	24.7	7.07	8.45							
11-21-94	102	600	24.7	7.10	8.54							
11-22-94	103	600	24.8	7.10	8.40							
11-23-94	104	800	22.0	7.24	8.75	47.6	85.5	206	0.00	0.00	0.043	0.00034
11-24-94	105	730	22.5	7.02	8.25							
11-25-94	106	1020	22.0	7.02	9.67							
11-26-94	107	1000	22.1	6.98	8.82							
11-27-94	108	900	21.3	6.93	9.05							
11-28-94	109	900	22.0	6.93	9.05							
11-29-94	110	900	21.3	6.78	9.10							
11-30-94	111	900	21.3	6.77	8.94							
12-01-94	112	900	20.9	6.77	8.89	27.2	85.5	189	0.00	0.00	0.043	0.00011
12-02-94	113	1000	26.4	7.00	8.40							
12-03-94	114	1000	24.9	6.97	7.85							
12-04-94	115	1100	25.2	6.87	8.11							
12-05-94	116	900	25.0	6.92	7.80							
12-06-94	117	900	25.0	7.33	7.90							
12-07-94	118	800	25.0	7.37	8.70							
12-08-94	119	1100	25.1	7.32	7.80	88.4	68.4	278	0.00	0.00	0.040	0.00047
12-09-94	120	1000	24.9	7.42	7.71							

12-10-94	121	1300	25.2	7.39	7.55							
12-11-94	122	900	25.2	7.37	7.72							
12-12-94	123	900	24.4	7.38	8.29							
12-13-94	124	900	24.0	7.42	8.56							
12-14-94	125	900	24.0	7.44	8.48							
12-15-94	126	800	24.7	7.42	8.38	81.6	68.4	270	0.00	0.00	0.067	0.00096
12-16-94	127	1100	24.6	7.40	8.04							
12-17-94	128	845	25.3	7.49	7.61							
12-18-94	129	930	24.8	7.43	7.39							
12-19-94	130	1000	25.0	7.31	7.66							
12-20-94	131	1100	24.8	7.38	8.06							
12-21-94	132	1000	24.5	7.31	8.02	81.6	68.4	264	0.00	0.00	0.100	0.00111
12-22-94	133	800	24.5	7.46	7.85							
12-23-94	134	1000	24.6	7.32	7.90							
12-24-94	135	900	24.6	7.47	8.05							
12-25-94	136	700	23.5	7.57	8.33							
12-26-94	137	1000	23.6	7.32	8.55							
12-27-94	138	1100	24.2	7.50	8.35							
12-28-94	139	1000	24.2	7.43	8.85							
12-29-94	140	900	24.4	7.45	8.01	88.4	85.5	283	0.00	0.00	0.040	0.00060
12-30-94	141	1000	24.1	7.41	8.03							
12-31-94	142	1000	24.1	7.32	8.08							
01-01-95	143	1100	24.4	7.42	8.00							
01-02-95	144	1000	24.4	7.47	7.97							
01-03-95	145	1100	24.1	7.40	8.62							
01-04-95	146	900	24.2	7.47	8.14							
01-05-95	147	1100	23.7	7.46	9.18	88.4	68.4	286	0.00	0.00	0.026	0.00038
01-06-95	148	1000	23.0	7.45	8.77							
01-07-95	149	1130	23.3	7.40	9.37							
01-08-95	150	1030	23.1	7.53	9.34							
01-09-95	151	1000	23.0	7.41	9.74							
01-10-95	152	1000	23.6	7.49	8.32							
01-11-95	153	1000	24.0	7.52	7.64							
01-12-95	154	1100	24.4	7.43	7.49	95.2	102.6	296	0.00	0.00	0.027	0.00039
01-13-95	155	1000	24.1	7.47	7.12							
01-14-95	156	900	24.4	7.46	7.79							
01-15-95	157	800	24.9	7.40	7.84							
01-16-95	158	1030	24.7	7.43	7.98							
01-17-95	159	1000	24.4	7.42	8.22							
01-18-95	160	1000	24.3	7.52	7.50							
01-19-95	161	1000	24.4	7.74	7.67	81.6	85.5	284	0.00	0.00	a	a
01-20-95	162	1000	24.6	7.45	7.61							
01-21-95	163	1000	24.9	7.42	7.20							
01-22-95	164	1100	24.7	7.53	7.27							

01-23-95	165	600	24.4	7.58	7.89							
01-24-95	166	1000	24.5	7.48	8.65							
01-25-95	167	1100	22.5	7.48	7.71							
01-26-95	168	1100	23.0	7.45	7.71	88.4	85.5	290	0.00	0.00	0.011	0.00015
01-27-95	169	1000	23.0	7.40	7.74							
01-28-95	170	830	24.2	7.49	7.58							
01-29-95	171	900	23.7	7.41	8.14							
01-30-95	172	1000	24.0	7.32	7.86							
01-31-95	173	1000	22.5	7.40	8.37							
02-01-95	174	1000	25.1	7.36	7.50							
02-02-95	175	900	25.2	7.47	8.03	95.2	85.5	289	0.00	0.00	0.024	0.00040
02-03-95	176	930	24.8	7.40	8.00							
02-04-95	177	1000	25.0	7.38	8.17							
02-05-95	178	1200	24.0	7.16	8.21							
02-06-95	179	930	21.3	7.36	8.94							
02-07-95	180	900	22.5	7.38	8.47							
02-08-95	181	900	22.5	7.17	8.44							
02-09-95	182	900	21.0	7.20	9.26	47.6	85.5	253	0.00	0.00	0.015	0.00010
02-10-95	183	900	21.8	7.07	8.87							
02-11-95	184	900	21.0	7.03	9.38							
02-12-95	185	1200	20.7	6.92	9.70							
02-13-95	186	900	19.8	6.94	9.89							
02-14-95	187	900	19.6	7.03	9.59							
02-15-95	188	900	20.2	6.99	9.65							
02-16-95	189	900	20.5	6.99	9.60	34.0	85.5	248	0.00	0.00	0.028	0.00011
02-17-95	190	900	19.9	6.99	9.42							
02-18-95	191	1100	19.9	7.01	10.06							
02-19-95	192	1400	20.9	6.90	9.78							
02-20-95	193	1000	20.2	6.92	9.54							
02-21-95	194	1000	20.5	7.00	9.41							
02-22-95	195	900	20.3	7.04	9.20							
02-23-95	196	1000	21.5	7.01	7.14	34.0	85.5	252	0.00	0.00	0.037	0.00020
02-24-95	197	1000	21.0	7.02	8.94							
02-25-95	198	1000	20.6	7.06	9.14							
02-26-95	199	1800	21.0	7.11	9.39							
02-27-95	200	900	20.9	7.01	9.05							
02-28-95	201	900	21.7	7.02	8.94							
03-01-95	202	900	21.8	6.94	8.92							
03-02-95	203	900	21.1	7.03	9.06	34.0	85.5	347	0.00	0.00	0.013	0.00006
03-03-95	204	900	20.9	7.04	8.92							
03-04-95	205	1000	21.9	7.02	8.85							
03-05-95	206	1015	22.1	7.03	8.88							
03-06-95	207	900	22.3	6.96	8.84							
03-07-95	208	900	22.9	6.99	8.59							

03-08-95	209	900	22.9	7.02	8.47							
03-09-95	210	1000	23.8	7.03	8.22	40.8	85.5	250	0.00	0.00	0.015	0.00008
03-10-95	211	900	25.2	6.94	8.06							
03-11-95	212	1100	24.3	6.96	8.28							
03-12-95	213	1800	25.2	6.99	8.04							
03-13-95	214	900	24.3	6.97	8.12							
03-14-95	215	900	24.6	6.94	8.35							
03-15-95	216	900	24.5	7.05	8.13							
03-16-95	217	900	25.1	6.90	8.30	47.6	85.5	223	0.00	0.00	0.010	0.00004
03-17-95	218	900	25.1	7.02	8.08							
03-18-95	219	1000	24.9	6.94	7.90							
03-19-95	220	1600	25.8	6.98	8.07							
03-20-95	221	900	25.2	7.01	7.99							
03-21-95	222	900	25.5	7.03	7.64							
03-22-95	223	900	25.5	7.00	7.83							
03-23-95	224	1100	25.3	6.95	7.66	47.6	85.5	235	0.00	0.00	a	a
03-24-95	225	900	25.3	7.03	6.81							
03-25-95	226	915	25.8	7.05	7.50							
03-26-95	227	900	25.7	7.05	8.15							
03-27-95	228	900	25.7	6.96	7.60							
03-28-95	229	900	24.8	6.96	7.39							
03-29-95	230	900	24.6	6.99	7.27							
03-30-95	231	900	24.2	6.93	7.15	47.6	85.5	228	0.00	0.00	0.058	0.00023
03-31-95	232	900	24.8	6.95	7.10							
04-01-95	233	900	24.4	7.02	7.51							
04-02-95	234	1000	24.5	7.04	8.09							
04-03-95	235	900	24.1	7.01	7.91							
04-04-95	236	900	24.6	7.11	7.50							
04-05-95	237	900	24.1	7.01	7.42							
04-06-95	238	900	24.3	7.01	7.66	40.8	85.5	237	0.00	0.00	0.060	0.00024
04-07-95	239	900	24.5	7.00	7.49							
04-08-95	240	1100	24.7	6.99	7.71							
04-09-95	241	1300	25.1	7.01	8.16							
04-10-95	242	900	24.7	6.99	7.18							
04-11-95	243	900	25.0	7.00	7.18							
04-12-95	244	900	25.2	7.02	7.15							
04-13-95	245	1100	25.2	7.05	7.18	40.8	85.5	256	0.00	0.00	0.031	0.00015
04-14-95	246	900	24.9	6.95	6.71							
04-15-95	247	1400	25.4	7.05	7.47							
04-16-95	248	1100	25.1	7.22	7.40							
04-17-95	249	900	25.1	7.03	7.17							
04-18-95	250	900	25.0	6.99	7.34							
04-19-95	251	900	25.5	7.00	7.32							
04-20-95	252	900	25.0	7.00	7.28	40.8	68.4	229	0.00	0.00	a	a

04-21-95	253	900	25.2	7.02	7.08							
04-22-95	254	1200	25.8	7.00	7.08							
04-23-95	255	2000	25.3	7.00	7.38							
04-24-95	256	900	24.9	7.00	6.98							
04-25-95	257	900	24.9	7.00	6.89							
04-26-95	258	900	24.7	7.04	6.78							
04-27-95	259	900	25.1	7.01	6.89	40.8	85.5	232	0.00	0.00	a	a
04-28-95	260	900	25.1	7.02	6.98							
04-29-95	261	1100	25.2	7.02	6.74							
04-30-95	262	1600	25.1	7.03	7.50							
05-01-95	263	900	25.0	7.00	7.66							
05-02-95	264	900	24.9	6.99	8.18							
05-03-95	265	900	24.7	7.03	7.29							
05-04-95	266	900	24.8	6.98	7.42	40.8	85.5	233	0.00	0.00	a	a
05-05-95	267	900	25.1	7.00	7.23							
05-06-95	268	830	25.3	7.02	7.10							
05-07-95	269	900	25.1	6.81	6.99							
05-08-95	270	900	25.0	6.99	7.28							
05-09-95	271	900	25.0	6.99	6.95							
05-10-95	272	900	25.6	6.98	7.15							
MEAN			24.1		8.22	51.2	83.7	242			0.040	0.00031
MINIMUM			19.6	6.76	6.71	27.2	68.4	189	0.00	0.00	0.000	0.00000
MAXIMUM			26.4	7.74	10.06	95.2	102.6	347	0.00	0.00	0.193	0.00122
Std Dev			1.34		0.698	20.91	7.64	32.9			0.0369	0.000308
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 29
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.5	6.27	8.65							
08-13-94	2	900	24.8	6.19	7.47							
08-14-94	3	900	24.9	6.25	7.50							
08-15-94	4	900	24.5	6.21	7.85							
08-16-94	5	1000	24.7	6.17	7.54							
08-17-94	6	1000	24.8	6.27	7.17							
08-18-94	7	900	24.7	6.27	6.89	27.2	85.5	258	0.00	0.00	0.142	0.00015
08-19-94	8	800	24.5	5.82	7.91							
08-20-94	9	1000	24.6	5.96	7.87							
08-21-94	10	800	24.7	6.05	7.82							
08-22-94	11	900	24.5	6.10	7.80							
08-23-94	12	730	24.2	6.00	7.86							
08-24-94	13	1000	24.3	5.97	7.96							
08-25-94	14	1100	24.3	6.05	8.24	27.2	85.5	267	0.00	0.00	0.084	0.00005
08-26-94	15	900	24.3	6.08	7.93							
08-27-94	16	900	24.3	6.11	7.85							
08-28-94	17	800	24.4	6.09	7.81							
08-29-94	18	900	24.7	6.15	7.76							
08-30-94	19	900	24.1	6.15	7.85							
08-31-94	20	800	24.3	6.17	7.90							
09-01-94	21	1100	24.4	6.12	8.47	27.2	102.6	277	0.00	0.00	a	a
09-02-94	22	900	24.1	6.11	8.31							
09-03-94	23	815	23.8	6.26	7.81							
09-04-94	24	810	23.8	6.34	7.95							
09-05-94	25	1100	23.9	6.10	8.43							
09-06-94	26	900	23.6	6.09	8.41							
09-07-94	27	800	23.7	6.15	8.50							
09-08-94	28	1100	23.8	6.17	8.67	27.2	85.5	275	0.00	0.00	0.000	0.00000
09-09-94	29	900	23.9	6.14	9.25							
09-10-94	30	900	24.0	6.25	8.66							
09-11-94	31	800	23.6	6.16	8.28							
09-12-94	32	500	23.7	6.22	7.83							

09-13-94	33	700	23.8	6.19	8.52							
09-14-94	34	1400	24.5	6.16	8.22							
09-15-94	35	1300	24.4	6.18	8.01							
09-16-94	36	1200	24.5	6.08	8.01	27.2	85.5	276	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.3	6.33	7.92							
09-18-94	38	830	24.4	6.33	8.08							
09-19-94	39	1000	24.2	6.15	8.14							
09-20-94	40	1000	24.1	6.21	8.18							
09-21-94	41	1000	24.4	6.21	8.02							
09-22-94	42	900	24.5	6.23	8.06	27.2	85.5	279	0.00	0.00	a	a
09-23-94	43	1000	24.4	6.27	8.49							
09-24-94	44	845	24.3	6.23	7.88							
09-25-94	45	1300	24.5	a	8.13							
09-26-94	46	900	24.4	6.03	7.81							
09-27-94	47	800	24.3	6.05	8.34							
09-28-94	48	1000	24.2	5.94	7.80	27.2	85.5	255	a	a	a	a
09-29-94	49	1030	24.7	6.64	7.68							
09-30-94	50	1030	24.0	6.26	8.39							
10-01-94	51	900	23.9	6.28	7.52							
10-02-94	52	915	24.1	6.23	8.63							
10-03-94	53	1100	23.7	6.14	8.57							
10-04-94	54	1100	23.8	6.17	8.37							
10-05-94	55	1000	24.1	6.16	8.54							
10-06-94	56	800	23.7	6.18	8.02	27.2	68.4	268	0.00	0.00	a	a
10-07-94	57	1100	24.1	6.17	8.61						0.030	0.00002
10-08-94	58	1100	24.3	6.15	8.86							
10-09-94	59	1100	24.3	6.20	8.26							
10-10-94	60	1000	23.9	6.20	8.02							
10-11-94	61	1600	24.3	6.24	7.68							
10-12-94	62	900	23.8	6.25	8.24							
10-13-94	63	1300	24.5	6.31	7.94	27.2	85.5	275	0.00	0.00	a	a
10-14-94	64	1300	25.4	6.30	7.12							
10-15-94	65	900	24.7	6.25	7.54							
10-16-94	66	900	24.4	6.29	7.79							
10-17-94	67	1000	23.1	6.15	8.46							
10-18-94	68	800	24.1	6.13	7.55							
10-19-94	69	900	24.3	6.34	7.97							
10-20-94	70	900	24.0	6.25	7.72	27.2	85.5	274	0.00	0.00	0.018	0.00002
10-21-94	71	900	22.2	6.24	8.79							
10-22-94	72	800	23.8	6.30	8.17							
10-23-94	73	900	24.1	6.24	8.51							
10-24-94	74	900	23.9	6.27	8.09							
10-25-94	75	900	24.1	6.26	7.96							
10-26-94	76	800	23.9	6.31	8.08							

10-27-94	77	1100	24.6	6.31	8.29	34.0	85.5	269	0.00	0.00	0.018	0.00002
10-28-94	78	1000	24.3	6.33	8.34							
10-29-94	79	900	24.3	6.31	7.66							
10-30-94	80	900	24.5	6.32	8.39							
10-31-94	81	1000	24.7	6.28	8.78							
11-01-94	82	1100	24.9	6.24	8.61							
11-02-94	83	1000	24.5	6.30	8.68							
11-03-94	84	1000	24.5	6.25	7.67							
11-04-94	85	1000	24.7	6.26	7.88	34.0	85.5	277	0.00	0.00	0.050	0.00005
11-05-94	86	1000	24.6	6.47	8.87							
11-06-94	87	1000	24.8	6.26	8.60							
11-07-94	88	700	24.4	6.29	8.80							
11-08-94	89	1000	24.4	6.31	8.71							
11-09-94	90	1000	24.5	6.31	8.62							
11-10-94	91	1100	24.5	6.29	7.65							
11-11-94	92	900	24.1	6.25	7.86	34.0	85.5	278	0.00	0.00	0.052	0.00005
11-12-94	93	845	23.9	6.53	7.55							
11-13-94	94	830	24.2	6.52	8.04							
11-14-94	95	1000	24.1	6.27	8.34							
11-15-94	96	900	24.5	6.28	8.37							
11-16-94	97	900	24.4	6.28	7.92	27.2	85.5	263	0.00	0.00	0.033	0.00003
11-17-94	98	900	24.6	6.33	8.09							
11-18-94	99	900	24.7	6.25	7.92							
11-19-94	100	800	24.6	6.30	7.92							
11-20-94	101	900	24.5	6.28	8.14							
11-21-94	102	600	24.5	6.30	8.09							
11-22-94	103	600	24.6	6.33	8.03							
11-23-94	104	800	22.4	6.59	8.37	40.8	85.5	255	0.00	0.00	0.043	0.00008
11-24-94	105	730	22.8	6.35	7.81							
11-25-94	106	1020	22.6	6.31	9.13							
11-26-94	107	1000	22.6	6.21	8.22							
11-27-94	108	900	22.0	6.24	8.41							
11-28-94	109	900	22.6	6.20	8.53							
11-29-94	110	900	22.1	6.04	8.53							
11-30-94	111	900	22.1	6.05	8.35							
12-01-94	112	900	21.8	6.04	8.29	27.2	85.5	244	0.00	0.00	0.039	0.00002
12-02-94	113	1000	26.4	6.29	8.03							
12-03-94	114	1000	24.8	6.31	7.62							
12-04-94	115	1100	25.1	6.15	7.91							
12-05-94	116	900	25.0	6.28	7.66							
12-06-94	117	900	25.1	6.85	7.79							
12-07-94	118	800	25.1	6.92	8.55							
12-08-94	119	1100	25.2	6.91	7.63	68.0	68.4	321	0.00	0.00	0.031	0.00014
12-09-94	120	1000	25.1	6.91	7.43							

12-10-94	121	1300	25.3	6.90	7.40							
12-11-94	122	900	25.3	6.87	7.52							
12-12-94	123	900	24.7	6.92	7.84							
12-13-94	124	900	24.6	6.92	7.99							
12-14-94	125	900	24.5	6.89	7.95							
12-15-94	126	800	25.3	6.94	7.88	61.2	68.4	311	0.00	0.00	0.069	0.00035
12-16-94	127	1100	25.1	6.93	7.50							
12-17-94	128	845	25.4	6.99	7.30							
12-18-94	129	930	25.2	6.96	7.18							
12-19-94	130	1000	25.5	6.84	7.11							
12-20-94	131	1100	25.3	6.87	7.47							
12-21-94	132	1000	25.1	6.82	7.36	61.2	68.4	306	0.00	0.00	0.110	0.00041
12-22-94	133	800	24.7	6.94	7.35							
12-23-94	134	1000	24.8	6.88	7.30							
12-24-94	135	900	24.9	6.90	7.47							
12-25-94	136	700	23.8	7.06	7.89							
12-26-94	137	1000	24.4	6.84	7.45							
12-27-94	138	1100	24.6	6.98	7.80							
12-28-94	139	1000	24.7	6.96	7.87							
12-29-94	140	900	24.7	6.96	7.25	68.0	85.5	321	0.00	0.00	0.043	0.00022
12-30-94	141	1000	24.6	6.90	7.17							
12-31-94	142	1000	24.7	6.81	7.09							
01-01-95	143	1100	24.8	6.95	7.29							
01-02-95	144	1000	24.7	6.98	7.35							
01-03-95	145	1100	24.5	6.94	7.73							
01-04-95	146	900	24.6	7.00	7.29							
01-05-95	147	1100	24.1	6.95	8.32	68.0	68.4	321	0.00	0.00	0.026	0.00012
01-06-95	148	1000	23.3	6.99	8.06							
01-07-95	149	1130	23.7	6.88	8.71							
01-08-95	150	1030	23.4	7.05	8.67							
01-09-95	151	1000	23.2	6.94	8.98							
01-10-95	152	1000	24.0	6.98	7.47							
01-11-95	153	1000	24.2	7.15	7.07							
01-12-95	154	1100	24.2	7.00	7.14	74.8	102.6	331	0.00	0.00	0.026	0.00014
01-13-95	155	1000	24.1	7.01	6.79							
01-14-95	156	900	24.4	6.96	7.46							
01-15-95	157	800	24.9	6.85	7.49							
01-16-95	158	1030	24.6	7.01	7.48							
01-17-95	159	1000	24.5	6.94	7.59							
01-18-95	160	1000	24.5	7.06	6.86							
01-19-95	161	1000	24.7	7.14	6.94	68.0	85.5	319	0.00	0.00	a	a
01-20-95	162	1000	24.9	6.97	6.95							
01-21-95	163	1000	25.0	7.01	6.67							
01-22-95	164	1100	25.0	7.12	6.51							

01-23-95	165	600	24.7	7.09	7.07							
01-24-95	166	1000	24.8	6.90	7.33							
01-25-95	167	1100	22.7	6.90	6.87							
01-26-95	168	1100	23.2	6.92	6.75	74.8	85.5	322	0.00	0.00	0.010	0.00004
01-27-95	169	1000	23.2	6.94	6.66							
01-28-95	170	830	24.2	7.01	6.64							
01-29-95	171	900	24.0	6.89	7.06							
01-30-95	172	1000	24.4	6.84	6.64							
01-31-95	173	1000	23.2	6.94	7.12							
02-01-95	174	1000	25.4	6.86	6.43							
02-02-95	175	900	25.6	6.93	6.96	74.8	85.5	329	0.00	0.00	0.025	0.00013
02-03-95	176	930	25.4	6.93	6.77							
02-04-95	177	1000	25.3	6.84	7.48							
02-05-95	178	1200	24.5	6.83	7.45							
02-06-95	179	930	22.2	6.83	7.78							
02-07-95	180	900	23.4	6.93	7.56							
02-08-95	181	900	23.4	6.76	7.40							
02-09-95	182	900	21.8	6.84	8.31	40.8	85.5	294	0.00	0.00	0.015	0.00005
02-10-95	183	900	22.7	6.55	7.88							
02-11-95	184	900	21.8	6.38	8.61							
02-12-95	185	1200	21.6	6.22	8.83							
02-13-95	186	900	21.0	6.37	8.79							
02-14-95	187	900	20.9	6.37	8.61							
02-15-95	188	900	21.5	6.32	8.62							
02-16-95	189	900	21.6	6.30	8.82	27.2	85.5	290	0.00	0.00	0.025	0.00002
02-17-95	190	900	20.8	6.30	8.81							
02-18-95	191	1100	21.0	6.28	9.16							
02-19-95	192	1400	21.9	6.29	9.05							
02-20-95	193	1000	21.2	6.22	8.74							
02-21-95	194	1000	21.3	6.32	8.77							
02-22-95	195	900	21.1	6.29	8.38							
02-23-95	196	1000	22.4	6.30	8.55	27.2	85.5	295	0.00	0.00	0.034	0.00003
02-24-95	197	1000	21.9	6.35	8.33							
02-25-95	198	1000	21.7	6.36	8.45							
02-26-95	199	1800	22.1	6.39	8.72							
02-27-95	200	900	21.9	6.38	8.32							
02-28-95	201	900	22.6	6.28	8.39							
03-01-95	202	900	22.6	6.27	8.42							
03-02-95	203	900	22.1	6.39	8.48	34.0	85.5	372	0.00	0.00	0.012	0.00001
03-03-95	204	900	21.8	6.38	8.23							
03-04-95	205	1000	22.9	6.40	8.18							
03-05-95	206	1015	23.1	6.46	8.16							
03-06-95	207	900	23.1	6.29	8.29							
03-07-95	208	900	23.6	6.37	8.13							

03-08-95	209	900	23.2	6.39	8.18							
03-09-95	210	1000	23.3	6.35	7.99	34.0	85.5	291	0.00	0.00	0.015	0.00002
03-10-95	211	900	25.1	6.39	7.48							
03-11-95	212	1100	24.2	6.32	7.83							
03-12-95	213	1800	25.0	6.30	7.73							
03-13-95	214	900	24.1	6.36	7.73							
03-14-95	215	900	24.1	6.34	8.09							
03-15-95	216	900	24.2	6.33	7.96							
03-16-95	217	900	24.5	6.31	8.25	40.8	85.5	266	0.00	0.00	0.010	0.00001
03-17-95	218	900	24.8	6.31	7.88							
03-18-95	219	1000	24.1	6.38	7.87							
03-19-95	220	1600	25.6	6.36	7.87							
03-20-95	221	900	24.9	6.35	7.82							
03-21-95	222	900	24.9	6.33	7.59							
03-22-95	223	900	25.1	6.29	7.86							
03-23-95	224	1100	25.2	6.28	7.50	40.8	85.5	291	0.00	0.00	a	a
03-24-95	225	900	25.0	6.35	6.55							
03-25-95	226	915	25.4	6.45	7.04							
03-26-95	227	900	25.3	6.45	7.70							
03-27-95	228	900	25.5	6.32	7.13							
03-28-95	229	900	25.3	6.27	6.77							
03-29-95	230	900	25.1	6.32	6.77							
03-30-95	231	900	25.1	6.34	6.79	34.0	85.4	279	0.00	0.00	0.055	0.00006
03-31-95	232	900	25.2	6.30	6.58							
04-01-95	233	900	24.8	6.42	7.17							
04-02-95	234	1000	25.1	6.41	7.46							
04-03-95	235	900	24.6	6.34	7.26							
04-04-95	236	900	25.2	6.42	7.10							
04-05-95	237	900	24.9	6.38	6.90							
04-06-95	238	900	25.0	6.42	7.06	27.2	85.5	290	0.00	0.00	0.058	0.00006
04-07-95	239	900	25.3	6.39	7.00							
04-08-95	240	1100	25.5	6.38	7.17							
04-09-95	241	1300	25.7	6.38	7.62							
04-10-95	242	900	25.4	6.35	6.71							
04-11-95	243	900	25.6	6.37	7.18							
04-12-95	244	900	25.5	6.42	7.13							
04-13-95	245	1100	25.5	6.46	7.23	34.0	85.5	303	0.00	0.00	0.032	0.00004
04-14-95	246	900	25.3	6.38	6.77							
04-15-95	247	1400	25.9	6.45	7.35							
04-16-95	248	1100	25.7	6.40	7.13							
04-17-95	249	900	25.6	6.45	7.06							
04-18-95	250	900	25.4	6.41	7.44							
04-19-95	251	900	25.5	6.46	7.65							
04-20-95	252	900	25.4	6.38	7.50	34.0	68.4	276	0.00	0.00	a	a

04-21-95	253	900	25.5	6.44	7.27							
04-22-95	254	1200	26.1	6.44	7.29							
04-23-95	255	2000	25.5	6.42	7.40							
04-24-95	256	900	24.7	6.50	7.14							
04-25-95	257	900	24.9	6.42	7.05							
04-26-95	258	900	24.6	6.50	7.15							
04-27-95	259	900	25.0	6.44	7.19	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.1	6.40	7.22							
04-29-95	261	1100	25.2	6.44	6.84							
04-30-95	262	1600	25.1	6.42	7.57							
05-01-95	263	900	24.9	6.49	8.02							
05-02-95	264	900	24.8	6.46	8.52							
05-03-95	265	900	24.7	6.48	7.56							
05-04-95	266	900	24.8	6.45	7.81	34.0	85.5	284	0.00	0.00	a	a
05-05-95	267	900	25.2	6.48	7.76							
05-06-95	268	830	25.1	6.47	7.47							
05-07-95	269	900	25.1	6.52	7.41							
05-08-95	270	900	25.0	6.45	7.73							
05-09-95	271	900	24.9	6.47	7.42							
05-10-95	272	900	25.6	6.35	7.46							
MEAN			24.2		7.82	40.3	83.7	289			0.038	0.00008
MINIMUM			20.8	5.82	6.43	27.2	68.4	244	0.00	0.00	0.000	0.00000
MAXIMUM			26.4	7.15	9.25	74.8	102.6	372	0.00	0.00	0.142	0.00041
Std Dev			1.08		0.597	16.61	7.64	26.1			0.0311	0.000097
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 30
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
NO DEN EXPOSURE

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.5	6.27	8.62							
08-13-94	2	900	24.9	6.19	7.43							
08-14-94	3	900	25.0	6.25	7.57							
08-15-94	4	900	24.6	6.20	7.76							
08-16-94	5	1000	24.8	6.17	7.24							
08-17-94	6	1000	24.9	6.30	6.70							
08-18-94	7	900	24.8	6.28	6.54	27.2	85.5	258	0.00	0.00	0.180	0.00019
08-19-94	8	800	24.7	5.82	7.91							
08-20-94	9	1000	24.8	5.95	7.88							
08-21-94	10	800	24.8	6.05	7.80							
08-22-94	11	900	24.7	6.10	7.78							
08-23-94	12	730	24.4	6.00	7.79							
08-24-94	13	1000	24.5	5.97	7.95							
08-25-94	14	1100	24.5	6.04	8.35	27.2	85.5	267	0.00	0.00	0.081	0.00005
08-26-94	15	900	24.5	6.08	7.92							
08-27-94	16	900	24.5	6.11	7.86							
08-28-94	17	800	24.5	6.09	7.81							
08-29-94	18	900	24.9	6.15	7.79							
08-30-94	19	900	24.3	6.15	7.80							
08-31-94	20	800	24.5	6.20	7.86							
09-01-94	21	1100	24.7	6.16	8.41	27.2	102.6	277	0.00	0.00	a	a
09-02-94	22	900	24.3	6.15	8.29							
09-03-94	23	815	23.9	6.24	7.78							
09-04-94	24	810	23.8	6.34	7.84							
09-05-94	25	1100	24.1	6.15	8.37							
09-06-94	26	900	23.8	6.12	8.34							
09-07-94	27	800	23.9	6.15	8.45							
09-08-94	28	1100	23.7	6.15	8.63	27.2	85.5	274	0.00	0.00	0.000	0.00000
09-09-94	29	900	23.8	6.10	9.20							
09-10-94	30	900	23.8	6.21	8.61							
09-11-94	31	800	23.4	6.11	8.29							
09-12-94	32	500	23.5	6.18	7.85							

09-13-94	33	700	23.5	6.14	8.55							
09-14-94	34	1400	24.3	6.14	8.21							
09-15-94	35	1300	24.2	6.16	8.00							
09-16-94	36	1200	24.4	6.06	8.01	27.2	85.5	276	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.3	6.26	7.75							
09-18-94	38	830	24.4	6.25	7.93							
09-19-94	39	1000	24.0	6.11	8.09							
09-20-94	40	1000	24.0	6.16	8.18							
09-21-94	41	1000	24.2	6.16	8.11							
09-22-94	42	900	24.3	6.18	8.05	27.2	85.5	278	0.00	0.00	a	a
09-23-94	43	1000	24.4	6.24	8.46							
09-24-94	44	845	24.3	6.23	7.74							
09-25-94	45	1300	24.5	a	8.09							
09-26-94	46	900	24.3	6.01	7.77							
09-27-94	47	800	24.4	6.05	8.34							
09-28-94	48	1000	24.2	5.93	7.77	27.2	68.4	255	a	a	a	a
09-29-94	49	1030	24.7	6.62	7.77							
09-30-94	50	1030	23.9	6.26	8.30							
10-01-94	51	900	23.8	6.20	7.65							
10-02-94	52	915	24.1	6.23	8.63							
10-03-94	53	1100	23.5	6.10	8.57							
10-04-94	54	1100	23.4	6.14	8.38							
10-05-94	55	1000	23.7	6.10	8.50							
10-06-94	56	800	23.3	6.13	8.02	27.2	68.4	266	0.00	0.00	a	a
10-07-94	57	1100	23.8	6.12	8.71						0.032	0.00002
10-08-94	58	1100	24.0	6.21	8.86							
10-09-94	59	1100	24.1	6.18	8.28							
10-10-94	60	1000	23.6	6.18	8.03							
10-11-94	61	1600	23.9	6.20	7.78							
10-12-94	62	900	23.2	6.20	8.36							
10-13-94	63	1300	23.9	6.27	8.14	27.2	85.5	271	0.00	0.00	a	a
10-14-94	64	1300	25.1	6.26	7.25							
10-15-94	65	900	24.5	6.22	7.60							
10-16-94	66	900	24.1	6.25	7.84							
10-17-94	67	1000	24.0	6.35	6.24							
10-18-94	68	800	23.8	6.08	7.55							
10-19-94	69	900	24.0	6.30	8.00							
10-20-94	70	900	24.0	6.25	7.56	27.2	85.5	275	0.00	0.00	0.026	0.00002
10-21-94	71	900	22.2	6.24	8.52							
10-22-94	72	800	23.6	6.30	8.00							
10-23-94	73	900	24.1	6.24	8.35							
10-24-94	74	900	23.9	6.27	7.95							
10-25-94	75	900	24.0	6.26	7.84							
10-26-94	76	800	23.8	6.31	8.00							

10-27-94	77	1100	24.5	6.31	8.31	34.0	85.5	269	0.00	0.00	0.018	0.00002
10-28-94	78	1000	24.2	6.33	8.33							
10-29-94	79	900	24.2	6.31	7.64							
10-30-94	80	900	24.7	6.32	8.36							
10-31-94	81	1000	24.7	6.28	8.73							
11-01-94	82	1100	25.1	6.24	8.43							
11-02-94	83	1000	24.7	6.30	8.54							
11-03-94	84	1000	24.5	6.25	7.63							
11-04-94	85	1000	24.7	6.26	7.75	34.0	85.5	277	0.00	0.00	0.052	0.00005
11-05-94	86	1000	24.7	6.47	8.76							
11-06-94	87	1000	25.0	6.26	8.46							
11-07-94	88	700	24.4	6.29	8.68							
11-08-94	89	1000	24.4	6.31	8.68							
11-09-94	90	1000	24.6	6.31	8.51							
11-10-94	91	1100	24.6	6.29	7.53							
11-11-94	92	900	24.0	6.25	7.85	34.0	85.5	278	0.00	0.00	0.052	0.00005
11-12-94	93	845	23.9	6.46	7.62							
11-13-94	94	830	24.1	6.50	8.12							
11-14-94	95	1000	24.2	6.27	8.30							
11-15-94	96	900	24.5	6.28	8.38							
11-16-94	97	900	24.5	6.28	7.86	27.2	85.5	263	0.00	0.00	0.036	0.00004
11-17-94	98	900	24.6	6.33	8.01							
11-18-94	99	900	24.8	6.25	7.84							
11-19-94	100	800	24.7	6.30	7.80							
11-20-94	101	900	24.5	6.28	8.14							
11-21-94	102	600	24.4	6.30	8.10							
11-22-94	103	600	24.6	6.33	7.93							
11-23-94	104	800	22.2	6.59	8.42	40.8	85.5	256	0.00	0.00	0.042	0.00008
11-24-94	105	730	22.9	6.29	7.66							
11-25-94	106	1020	22.7	6.29	8.79							
11-26-94	107	1000	22.8	6.21	7.80							
11-27-94	108	900	22.1	6.24	8.16							
11-28-94	109	900	23.1	6.20	8.18							
11-29-94	110	900	22.3	6.04	8.22							
11-30-94	111	900	22.4	6.05	8.11							
12-01-94	112	900	22.0	6.04	8.12	27.2	85.5	245	0.00	0.00	0.046	0.00002
12-02-94	113	1000	26.8	6.29	7.80							
12-03-94	114	1000	25.0	6.29	7.31							
12-04-94	115	1100	25.3	6.15	7.54							
12-05-94	116	900	25.5	6.28	7.10							
12-06-94	117	900	25.5	6.85	7.07							
12-07-94	118	800	25.4	6.92	7.76							
12-08-94	119	1100	25.4	6.91	6.95	68.0	85.5	322	0.00	0.00	0.035	0.00017
12-09-94	120	1000	25.3	6.91	7.02							

12-10-94	121	1300	25.5	6.90	6.81							
12-11-94	122	900	25.6	6.87	6.97							
12-12-94	123	900	24.8	6.92	7.50							
12-13-94	124	900	24.7	6.92	7.72							
12-14-94	125	900	24.7	6.89	7.62							
12-15-94	126	800	25.0	6.94	7.96	61.2	68.4	309	0.00	0.00	0.068	0.00034
12-16-94	127	1100	24.9	6.93	7.61							
12-17-94	128	845	25.2	6.96	7.21							
12-18-94	129	930	25.2	6.93	6.98							
12-19-94	130	1000	25.3	6.84	7.19							
12-20-94	131	1100	25.0	6.87	7.57							
12-21-94	132	1000	24.8	6.82	7.55	61.2	68.4	305	0.00	0.00	0.100	0.00037
12-22-94	133	800	24.6	6.94	7.43							
12-23-94	134	1000	24.8	6.88	7.40							
12-24-94	135	900	24.9	6.90	7.50							
12-25-94	136	700	23.8	7.03	7.88							
12-26-94	137	1000	24.1	6.84	7.77							
12-27-94	138	1100	24.6	6.98	7.68							
12-28-94	139	1000	24.6	6.96	8.20							
12-29-94	140	900	24.8	6.96	7.38	68.0	85.5	320	0.00	0.00	0.045	0.00023
12-30-94	141	1000	24.4	6.90	7.52							
12-31-94	142	1000	24.5	6.81	7.54							
01-01-95	143	1100	24.9	6.95	7.41							
01-02-95	144	1000	24.8	6.98	7.40							
01-03-95	145	1100	24.4	6.94	8.07							
01-04-95	146	900	24.4	7.00	7.62							
01-05-95	147	1100	24.2	6.95	8.48	68.0	68.4	320	0.00	0.00	0.025	0.00012
01-06-95	148	1000	23.4	6.96	8.19							
01-07-95	149	1130	23.8	6.86	8.67							
01-08-95	150	1030	23.8	7.03	8.46							
01-09-95	151	1000	23.8	6.94	8.65							
01-10-95	152	1000	24.2	6.98	7.39							
01-11-95	153	1000	24.3	7.15	6.88							
01-12-95	154	1100	24.8	7.00	6.63	74.8	102.6	335	0.00	0.00	0.026	0.00015
01-13-95	155	1000	24.8	7.01	6.15							
01-14-95	156	900	25.2	6.96	6.75							
01-15-95	157	800	25.4	6.85	6.96							
01-16-95	158	1030	25.4	7.01	6.94							
01-17-95	159	1000	24.6	6.94	7.49							
01-18-95	160	1000	24.7	7.06	6.78							
01-19-95	161	1000	24.8	7.14	6.95	68.0	85.5	318	0.00	0.00	a	a
01-20-95	162	1000	25.0	6.97	6.94							
01-21-95	163	1000	25.0	7.01	6.81							
01-22-95	164	1100	24.9	7.12	6.86							

01-23-95	165	600	24.5	7.09	7.40							
01-24-95	166	1000	24.6	6.90	7.90							
01-25-95	167	1100	22.5	6.90	7.21							
01-26-95	168	1100	23.0	6.92	7.36	74.8	85.5	322	0.00	0.00	0.009	0.00004
01-27-95	169	1000	23.0	6.94	7.76							
01-28-95	170	830	24.0	7.00	7.16							
01-29-95	171	900	23.5	6.89	7.77							
01-30-95	172	1000	23.9	6.84	7.48							
01-31-95	173	1000	22.9	6.94	7.80							
02-01-95	174	1000	25.2	6.86	7.11							
02-02-95	175	900	25.3	6.93	7.57	74.8	85.5	327	0.00	0.00	0.025	0.00012
02-03-95	176	930	24.8	6.93	7.69							
02-04-95	177	1000	25.4	6.84	7.58							
02-05-95	178	1200	24.5	6.83	7.64							
02-06-95	179	930	22.1	6.83	8.19							
02-07-95	180	900	23.1	6.93	8.01							
02-08-95	181	900	23.1	6.76	8.06							
02-09-95	182	900	21.5	6.84	8.70	40.8	85.5	293	0.00	0.00	0.016	0.00005
02-10-95	183	900	22.5	6.55	8.36							
02-11-95	184	900	21.9	6.38	8.66							
02-12-95	185	1200	21.4	6.22	9.05							
02-13-95	186	900	20.7	6.37	9.14							
02-14-95	187	900	20.7	6.37	8.91							
02-15-95	188	900	21.4	6.32	8.87							
02-16-95	189	900	21.8	6.30	8.82	27.2	85.5	292	0.00	0.00	0.026	0.00002
02-17-95	190	900	21.3	6.30	8.54							
02-18-95	191	1100	20.9	6.28	9.34							
02-19-95	192	1400	21.9	6.29	9.08							
02-20-95	193	1000	21.2	6.22	8.84							
02-21-95	194	1000	21.4	6.32	8.73							
02-22-95	195	900	21.1	6.29	8.62							
02-23-95	196	1000	22.2	6.30	8.77	27.2	85.5	295	0.00	0.00	0.035	0.00003
02-24-95	197	1000	22.1	6.35	8.36							
02-25-95	198	1000	21.5	6.36	8.64							
02-26-95	199	1800	21.9	6.39	8.84							
02-27-95	200	900	21.8	6.38	8.53							
02-28-95	201	900	22.6	6.28	8.46							
03-01-95	202	900	22.7	6.27	8.39							
03-02-95	203	900	22.1	6.39	8.57	34.0	85.5	373	0.00	0.00	0.011	0.00001
03-03-95	204	900	21.6	6.38	8.47							
03-04-95	205	1000	22.6	6.40	8.39							
03-05-95	206	1015	23.0	6.46	8.32							
03-06-95	207	900	23.0	6.29	8.43							
03-07-95	208	900	23.6	6.37	8.16							

03-08-95	209	900	23.6	6.39	7.92							
03-09-95	210	1000	23.4	6.35	7.92	34.0	85.5	294	0.00	0.00	0.014	0.00002
03-10-95	211	900	24.5	6.39	7.97							
03-11-95	212	1100	23.8	6.32	8.10							
03-12-95	213	1800	24.8	6.30	7.87							
03-13-95	214	900	24.1	6.36	7.77							
03-14-95	215	900	24.2	6.34	8.04							
03-15-95	216	900	24.3	6.33	7.92							
03-16-95	217	900	24.8	6.31	8.10	40.8	85.5	267	0.00	0.00	0.011	0.00001
03-17-95	218	900	25.0	6.31	7.76							
03-18-95	219	1000	24.3	6.38	7.75							
03-19-95	220	1600	25.5	6.36	7.82							
03-20-95	221	900	24.8	6.35	7.85							
03-21-95	222	900	25.0	6.33	7.52							
03-22-95	223	900	24.9	6.29	7.80							
03-23-95	224	1100	24.9	6.28	7.67	40.8	85.5	291	0.00	0.00	a	a
03-24-95	225	900	24.6	6.35	6.93							
03-25-95	226	915	25.0	6.47	7.31							
03-26-95	227	900	24.9	6.44	8.11							
03-27-95	228	900	25.0	6.32	7.47							
03-28-95	229	900	24.7	6.27	7.08							
03-29-95	230	900	24.7	6.32	6.85							
03-30-95	231	900	24.7	6.34	6.68	34.0	85.5	279	0.00	0.00	0.056	0.00006
03-31-95	232	900	24.9	6.30	6.81							
04-01-95	233	900	24.4	6.45	7.41							
04-02-95	234	1000	24.4	6.43	7.82							
04-03-95	235	900	24.0	6.34	7.63							
04-04-95	236	900	24.8	6.42	7.13							
04-05-95	237	900	24.2	6.38	7.25							
04-06-95	238	900	24.3	6.42	7.34	27.2	85.5	288	0.00	0.00	0.058	0.00006
04-07-95	239	900	24.8	6.39	7.09							
04-08-95	240	1100	25.1	6.38	7.32							
04-09-95	241	1300	25.6	6.38	7.57							
04-10-95	242	900	24.9	6.35	6.83							
04-11-95	243	900	25.1	6.37	7.50							
04-12-95	244	900	25.4	6.42	7.26							
04-13-95	245	1100	25.5	6.46	6.97	34.0	85.5	305	0.00	0.00	0.031	0.00004
04-14-95	246	900	25.2	6.38	6.90							
04-15-95	247	1400	25.6	6.45	7.60							
04-16-95	248	1100	25.4	6.40	7.47							
04-17-95	249	900	25.2	6.45	7.55							
04-18-95	250	900	25.2	6.41	7.67							
04-19-95	251	900	25.5	6.46	7.58							
04-20-95	252	900	25.4	6.38	6.40	34.0	68.4	277	0.00	0.00	a	a

04-21-95	253	900	25.5	6.44	7.22							
04-22-95	254	1200	26.0	6.44	7.18							
04-23-95	255	2000	25.2	6.42	7.75							
04-24-95	256	900	24.5	6.50	7.38							
04-25-95	257	900	24.8	6.42	6.93							
04-26-95	258	900	24.4	6.50	7.14							
04-27-95	259	900	24.9	6.44	7.10	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.0	6.40	6.94							
04-29-95	261	1100	25.0	6.44	6.77							
04-30-95	262	1600	24.9	6.42	7.66							
05-01-95	263	900	24.8	6.49	7.87							
05-02-95	264	900	24.6	6.46	8.39							
05-03-95	265	900	24.6	6.48	7.34							
05-04-95	266	900	24.7	6.45	7.52	34.0	85.5	285	0.00	0.00	a	a
05-05-95	267	900	25.1	6.48	7.43							
05-06-95	268	830	25.1	6.47	7.36							
05-07-95	269	900	25.0	6.54	7.25							
05-08-95	270	900	25.0	6.45	7.56							
05-09-95	271	900	24.8	6.47	7.27							
05-10-95	272	900	25.5	6.35	7.33							
MEAN			24.2		7.82	40.3	83.7	289			0.040	0.00008
MINIMUM			20.7	5.82	6.15	27.2	68.4	245	0.00	0.00	0.000	0.00000
MAXIMUM			26.8	7.15	9.34	74.8	102.6	373	0.00	0.00	0.180	0.00037
Std Dev			1.07		0.590	16.61	7.64	26.2			0.0350	0.000094
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 31
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.6	6.29	8.61							
08-13-94	2	900	24.9	6.19	7.53							
08-14-94	3	900	25.0	6.28	7.49							
08-15-94	4	900	24.6	6.26	7.79							
08-16-94	5	1000	24.8	6.21	7.28							
08-17-94	6	1000	24.9	6.30	7.23							
08-18-94	7	900	24.9	6.28	7.07	27.2	85.5	256	0.00	0.00	0.110	0.00012
08-19-94	8	800	24.7	5.88	7.93							
08-20-94	9	1000	24.8	5.99	7.88							
08-21-94	10	800	24.8	6.10	7.81							
08-22-94	11	900	24.7	6.14	7.81							
08-23-94	12	730	24.4	6.05	7.88							
08-24-94	13	1000	24.4	6.01	7.97							
08-25-94	14	1100	24.3	6.10	8.27	27.2	85.5	263	0.00	0.00	0.082	0.00006
08-26-94	15	900	24.3	6.11	7.95							
08-27-94	16	900	24.5	6.16	7.91							
08-28-94	17	800	24.5	6.13	7.86							
08-29-94	18	900	24.9	6.20	7.83							
08-30-94	19	900	24.3	6.20	7.91							
08-31-94	20	800	24.6	6.26	7.91							
09-01-94	21	1100	24.8	6.22	8.47	27.2	85.5	276	0.00	0.00	a	a
09-02-94	22	900	24.5	6.17	8.36							
09-03-94	23	815	24.1	6.27	7.76							
09-04-94	24	810	24.2	6.36	7.94							
09-05-94	25	1100	24.3	6.15	8.47							
09-06-94	26	900	24.1	6.16	8.47							
09-07-94	27	800	24.2	6.20	8.50							
09-08-94	28	1100	24.2	6.20	8.61	27.2	85.5	277	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.3	6.15	9.18							
09-10-94	30	900	24.3	6.26	8.60							
09-11-94	31	800	23.9	6.18	8.23							
09-12-94	32	500	24.1	6.25	7.83							

09-13-94	33	700	24.2	6.20	8.54							
09-14-94	34	1400	24.8	6.18	8.18							
09-15-94	35	1300	24.8	6.19	8.00							
09-16-94	36	1200	24.8	6.12	8.03	27.2	85.5	278	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.4	6.29	7.71							
09-18-94	38	830	24.5	6.31	8.00							
09-19-94	39	1000	24.5	6.18	8.03							
09-20-94	40	1000	24.5	6.23	8.20							
09-21-94	41	1000	24.8	6.23	8.14							
09-22-94	42	900	24.8	6.24	8.03	27.2	85.5	281	0.00	0.00	a	a
09-23-94	43	1000	24.8	6.27	8.44							
09-24-94	44	845	24.6	6.24	7.89							
09-25-94	45	1300	24.8	a	8.21							
09-26-94	46	900	24.6	6.06	7.84							
09-27-94	47	800	24.6	6.08	8.34							
09-28-94	48	1000	24.3	5.95	7.87	27.2	85.5	258	a	a	a	a
09-29-94	49	1030	24.8	6.66	7.65							
09-30-94	50	1030	24.2	6.33	8.31							
10-01-94	51	900	24.0	6.25	7.61							
10-02-94	52	915	24.2	6.25	8.67							
10-03-94	53	1100	24.0	6.19	8.70							
10-04-94	54	1100	24.0	6.22	8.43							
10-05-94	55	1000	24.5	6.20	8.51							
10-06-94	56	800	24.2	6.21	8.00	27.2	85.5	269	0.00	0.00	a	a
10-07-94	57	1100	24.7	6.20	8.61						0.028	0.00002
10-08-94	58	1100	24.8	6.24	8.76							
10-09-94	59	1100	24.9	6.24	8.25							
10-10-94	60	1000	24.5	6.24	7.97							
10-11-94	61	1600	24.8	6.29	7.60							
10-12-94	62	900	24.3	6.30	8.21							
10-13-94	63	1300	25.0	6.34	7.90	27.2	85.5	276	0.00	0.00	a	a
10-14-94	64	1300	25.8	6.32	7.18							
10-15-94	65	900	25.2	6.31	7.54							
10-16-94	66	900	24.8	6.32	7.75							
10-17-94	67	1000	26.2	6.45	5.63							
10-18-94	68	800	24.8	6.20	7.37							
10-19-94	69	900	24.9	6.37	7.81							
10-20-94	70	900	24.4	6.30	7.73	27.2	85.5	272	0.00	0.00	0.019	0.00002
10-21-94	71	900	22.7	6.28	8.80							
10-22-94	72	800	24.1	6.34	8.24							
10-23-94	73	900	24.5	6.31	8.57							
10-24-94	74	900	24.4	6.32	8.15							
10-25-94	75	900	24.5	6.33	8.00							
10-26-94	76	800	24.4	6.37	8.09							

10-27-94	77	1100	24.6	6.38	8.38	34.0	85.5	265	0.00	0.00	0.017	0.00002
10-28-94	78	1000	24.3	6.38	8.41							
10-29-94	79	900	24.2	6.36	7.72							
10-30-94	80	900	24.6	6.35	8.51							
10-31-94	81	1000	24.6	6.32	8.90							
11-01-94	82	1100	25.0	6.27	8.70							
11-02-94	83	1000	24.6	6.30	8.70							
11-03-94	84	1000	24.5	6.30	7.70							
11-04-94	85	1000	24.7	6.28	7.90	34.0	85.5	275	0.00	0.00	0.049	0.00005
11-05-94	86	1000	24.7	6.51	8.91							
11-06-94	87	1000	24.9	6.30	8.62							
11-07-94	88	700	24.4	6.32	8.85							
11-08-94	89	1000	24.5	6.35	8.83							
11-09-94	90	1000	24.6	6.36	8.73							
11-10-94	91	1100	24.6	6.33	7.74							
11-11-94	92	900	24.1	6.30	7.93	34.0	85.5	276	0.00	0.00	0.045	0.00005
11-12-94	93	845	23.9	6.46	7.54							
11-13-94	94	830	24.2	6.49	8.07							
11-14-94	95	1000	24.2	6.30	8.36							
11-15-94	96	900	24.5	6.31	8.40							
11-16-94	97	900	24.4	6.31	7.88	27.2	85.5	260	0.00	0.00	0.033	0.00004
11-17-94	98	900	24.5	6.37	8.06							
11-18-94	99	900	24.7	6.31	7.92							
11-19-94	100	800	24.6	6.35	7.96							
11-20-94	101	900	24.5	6.32	8.14							
11-21-94	102	600	24.4	6.34	8.15							
11-22-94	103	600	24.5	6.36	8.07							
11-23-94	104	800	22.7	6.62	8.43	40.8	85.5	252	0.00	0.00	0.045	0.00009
11-24-94	105	730	22.9	6.31	7.70							
11-25-94	106	1020	22.6	6.28	9.08							
11-26-94	107	1000	22.7	6.21	8.33							
11-27-94	108	900	22.1	6.24	8.53							
11-28-94	109	900	22.9	6.20	8.53							
11-29-94	110	900	22.2	6.04	8.63							
11-30-94	111	900	22.2	6.05	8.44							
12-01-94	112	900	21.9	6.04	8.38	27.2	85.5	244	0.00	0.00	0.045	0.00002
12-02-94	113	1000	26.7	6.30	7.84							
12-03-94	114	1000	24.9	6.27	7.66							
12-04-94	115	1100	25.1	6.17	7.97							
12-05-94	116	900	25.3	6.28	7.70							
12-06-94	117	900	25.2	6.85	7.81							
12-07-94	118	800	25.2	6.92	8.60							
12-08-94	119	1100	25.3	6.91	7.62	68.0	68.4	317	0.00	0.00	0.041	0.00019
12-09-94	120	1000	25.1	6.91	7.57							

12-10-94	121	1300	25.3	6.90	7.43							
12-11-94	122	900	25.4	6.87	7.55							
12-12-94	123	900	24.7	6.92	7.94							
12-13-94	124	900	24.5	6.92	8.14							
12-14-94	125	900	24.5	6.89	8.13							
12-15-94	126	800	25.2	6.95	8.09	61.2	68.4	311	0.00	0.00	0.063	0.00032
12-16-94	127	1100	25.1	6.93	7.67							
12-17-94	128	845	25.4	6.94	7.36							
12-18-94	129	930	25.3	6.89	7.21							
12-19-94	130	1000	25.4	6.84	7.28							
12-20-94	131	1100	25.3	6.87	7.64							
12-21-94	132	1000	25.1	6.82	7.58	61.2	68.4	304	0.00	0.00	0.110	0.00041
12-22-94	133	800	24.4	6.94	7.60							
12-23-94	134	1000	24.7	6.88	7.52							
12-24-94	135	900	24.8	6.90	7.72							
12-25-94	136	700	23.7	7.02	8.10							
12-26-94	137	1000	23.9	6.84	7.84							
12-27-94	138	1100	24.4	6.98	7.75							
12-28-94	139	1000	24.5	6.96	8.25							
12-29-94	140	900	24.5	6.96	7.51	68.0	85.5	317	0.00	0.00	0.042	0.00021
12-30-94	141	1000	24.3	6.90	7.51							
12-31-94	142	1000	24.5	6.81	7.49							
01-01-95	143	1100	24.8	6.95	7.48							
01-02-95	144	1000	24.6	6.98	7.55							
01-03-95	145	1100	24.3	6.94	8.05							
01-04-95	146	900	24.3	7.00	7.68							
01-05-95	147	1100	24.1	6.97	8.58	68.0	68.4	317	0.00	0.00	0.026	0.00013
01-06-95	148	1000	23.4	6.98	8.10							
01-07-95	149	1130	23.7	6.82	8.89							
01-08-95	150	1030	23.6	7.03	8.79							
01-09-95	151	1000	23.3	6.94	9.08							
01-10-95	152	1000	23.9	6.99	7.65							
01-11-95	153	1000	24.1	7.15	7.16							
01-12-95	154	1100	24.2	7.00	7.16	74.8	102.6	325	0.00	0.00	0.027	0.00014
01-13-95	155	1000	24.2	7.04	6.78							
01-14-95	156	900	24.5	6.96	7.46							
01-15-95	157	800	25.1	6.85	7.51							
01-16-95	158	1030	24.8	7.01	7.48							
01-17-95	159	1000	24.5	6.94	7.82							
01-18-95	160	1000	24.3	7.08	6.95							
01-19-95	161	1000	24.6	7.14	7.09	68.0	85.5	314	0.00	0.00	a	a
01-20-95	162	1000	24.7	6.97	7.03							
01-21-95	163	1000	24.9	7.01	6.64							
01-22-95	164	1100	24.8	7.12	6.59							

01-23-95	165	600	24.4	7.09	7.30							
01-24-95	166	1000	24.6	6.90	7.85							
01-25-95	167	1100	22.5	6.90	7.12							
01-26-95	168	1100	23.0	6.92	7.06	74.8	85.5	318	0.00	0.00	0.010	0.00004
01-27-95	169	1000	23.0	6.94	7.10							
01-28-95	170	830	23.9	6.99	6.96							
01-29-95	171	900	23.5	6.89	7.61							
01-30-95	172	1000	23.8	6.84	7.08							
01-31-95	173	1000	22.6	6.94	7.64							
02-01-95	174	1000	25.1	6.86	6.89							
02-02-95	175	900	25.2	6.93	7.39	74.8	85.5	323	0.00	0.00	0.026	0.00013
02-03-95	176	930	24.9	6.93	7.30							
02-04-95	177	1000	24.8	6.84	7.60							
02-05-95	178	1200	24.0	6.83	7.55							
02-06-95	179	930	21.6	6.83	8.12							
02-07-95	180	900	23.0	6.93	7.86							
02-08-95	181	900	22.9	6.76	7.68							
02-09-95	182	900	21.3	6.84	8.52	40.8	85.5	294	0.00	0.00	0.015	0.00005
02-10-95	183	900	22.1	6.55	8.08							
02-11-95	184	900	21.2	6.38	8.81							
02-12-95	185	1200	21.2	6.22	8.90							
02-13-95	186	900	20.3	6.37	9.06							
02-14-95	187	900	20.2	6.37	8.79							
02-15-95	188	900	20.9	6.32	8.79							
02-16-95	189	900	20.9	6.30	8.91	27.2	85.5	289	0.00	0.00	0.026	0.00002
02-17-95	190	900	20.3	6.30	8.84							
02-18-95	191	1100	20.5	6.28	9.10							
02-19-95	192	1400	21.4	6.29	8.92							
02-20-95	193	1000	20.7	6.22	8.74							
02-21-95	194	1000	20.9	6.32	8.68							
02-22-95	195	900	20.9	6.29	8.44							
02-23-95	196	1000	22.4	6.30	8.46	34.0	85.5	298	0.00	0.00	0.034	0.00003
02-24-95	197	1000	21.7	6.35	8.24							
02-25-95	198	1000	21.2	6.36	8.44							
02-26-95	199	1800	21.0	6.39	8.69							
02-27-95	200	900	21.5	6.38	8.46							
02-28-95	201	900	22.2	6.28	8.39							
03-01-95	202	900	22.3	6.27	8.29							
03-02-95	203	900	22.1	6.39	8.35	34.0	85.5	372	0.00	0.00	0.013	0.00001
03-03-95	204	900	21.6	6.38	8.28							
03-04-95	205	1000	22.6	6.40	8.27							
03-05-95	206	1015	22.8	6.43	8.22							
03-06-95	207	900	22.9	6.29	8.26							
03-07-95	208	900	23.3	6.37	8.03							

03-08-95	209	900	23.2	6.39	7.91							
03-09-95	210	1000	24.2	6.35	7.77	34.0	85.5	295	0.00	0.00	0.013	0.00002
03-10-95	211	900	25.6	6.39	7.50							
03-11-95	212	1100	25.0	6.32	7.74							
03-12-95	213	1800	25.6	6.30	7.60							
03-13-95	214	900	24.8	6.36	7.45							
03-14-95	215	900	25.0	6.34	7.97							
03-15-95	216	900	24.9	6.33	7.81							
03-16-95	217	900	25.4	6.31	8.01	40.8	85.5	270	0.00	0.00	0.011	0.00001
03-17-95	218	900	25.5	6.31	7.70							
03-18-95	219	1000	25.0	6.38	7.61							
03-19-95	220	1600	26.2	6.36	7.73							
03-20-95	221	900	25.4	6.35	7.59							
03-21-95	222	900	25.6	6.33	7.51							
03-22-95	223	900	25.6	6.29	7.62							
03-23-95	224	1100	25.6	6.28	7.38	40.8	85.5	298	0.00	0.00	a	a
03-24-95	225	900	25.6	6.35	6.45							
03-25-95	226	915	25.8	6.48	7.07							
03-26-95	227	900	26.0	6.47	7.64							
03-27-95	228	900	26.0	6.32	7.20							
03-28-95	229	900	25.1	6.27	6.96							
03-29-95	230	900	24.9	6.32	7.03							
03-30-95	231	900	24.9	6.34	6.88	34.0	85.5	281	0.00	0.00	0.054	0.00005
03-31-95	232	900	25.1	6.30	6.70							
04-01-95	233	900	24.6	6.41	7.14							
04-02-95	234	1000	24.7	6.37	7.54							
04-03-95	235	900	24.4	6.34	7.44							
04-04-95	236	900	24.9	6.42	7.09							
04-05-95	237	900	24.3	6.38	7.11							
04-06-95	238	900	24.7	6.42	7.18	27.2	85.5	290	0.00	0.00	0.056	0.00006
04-07-95	239	900	24.9	6.39	7.04							
04-08-95	240	1100	25.0	6.38	7.19							
04-09-95	241	1300	25.3	6.38	7.43							
04-10-95	242	900	24.9	6.35	6.69							
04-11-95	243	900	25.2	6.37	7.42							
04-12-95	244	900	25.4	6.42	7.29							
04-13-95	245	1100	25.4	6.46	7.16	34.0	85.5	305	0.00	0.00	0.032	0.00004
04-14-95	246	900	25.2	6.38	6.73							
04-15-95	247	1400	25.6	6.45	7.46							
04-16-95	248	1100	25.4	6.40	7.38							
04-17-95	249	900	25.3	6.45	7.32							
04-18-95	250	900	25.3	6.41	7.49							
04-19-95	251	900	25.4	6.46	7.57							
04-20-95	252	900	25.4	6.38	7.40	34.0	68.4	279	0.00	0.00	a	a

04-21-95	253	900	25.6	6.44	7.18							
04-22-95	254	1200	25.8	6.44	7.21							
04-23-95	255	2000	25.3	6.42	7.41							
04-24-95	256	900	24.6	6.50	7.13							
04-25-95	257	900	24.6	6.42	7.01							
04-26-95	258	900	24.4	6.50	7.13							
04-27-95	259	900	24.7	6.44	7.24	34.0	85.5	278	0.00	0.00	a	a
04-28-95	260	900	24.8	6.40	7.27							
04-29-95	261	1100	25.0	6.44	6.72							
04-30-95	262	1600	24.9	6.42	7.54							
05-01-95	263	900	24.7	6.49	7.93							
05-02-95	264	900	24.7	6.46	8.20							
05-03-95	265	900	24.5	6.48	7.46							
05-04-95	266	900	24.7	6.45	7.64	34.0	85.5	286	0.00	0.00	a	a
05-05-95	267	900	25.2	6.48	7.44							
05-06-95	268	830	25.1	6.45	7.34							
05-07-95	269	900	25.2	6.53	7.03							
05-08-95	270	900	25.2	6.45	7.32							
05-09-95	271	900	25.1	6.47	7.27							
05-10-95	272	900	25.6	6.35	7.35							
MEAN			24.3		7.85	40.4	83.7	288			0.037	0.00008
MINIMUM			20.2	5.88	5.63	27.2	68.4	244	0.00	0.00	0.000	0.00000
MAXIMUM			26.7	7.15	9.18	74.8	102.6	372	0.00	0.00	0.110	0.00041
Std Dev			1.20		0.586	16.51	6.55	25.3			0.0272	0.000095
N			272	271	272	38	38	38	38	38	29	29

a
Data not available; analytical instrument would not calibrate.

TANK No. 32
TANK CONCENTRATION: 25% GROUNDWATER (WELL CC-27B) DILUTED WITH APG-EA DECHLORINATED TAP WATER
DEN EXPOSURE: 10 mg/L

Date	Trailer Exposure Test Day	Time (Military)	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Residual Chlorine (mg/L)	Free Available Chlorine (mg/L)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
08-12-94	1	900	24.6	6.29	8.63							
08-13-94	2	900	25.0	6.20	7.53							
08-14-94	3	900	25.1	6.30	7.52							
08-15-94	4	900	24.7	6.26	7.85							
08-16-94	5	1000	24.9	6.21	7.49							
08-17-94	6	1000	24.9	6.30	7.26							
08-18-94	7	900	24.8	6.29	7.18	27.2	85.5	256	0.00	0.00	0.139	0.00015
08-19-94	8	800	24.7	5.88	7.92							
08-20-94	9	1000	24.8	6.00	7.86							
08-21-94	10	800	24.8	6.10	7.81							
08-22-94	11	900	24.7	6.14	7.81							
08-23-94	12	730	24.4	6.05	7.85							
08-24-94	13	1000	24.4	6.02	7.96							
08-25-94	14	1100	24.5	6.10	8.23	27.2	85.5	263	0.00	0.00	0.108	0.00007
08-26-94	15	900	24.4	6.11	7.90							
08-27-94	16	900	24.5	6.16	7.90							
08-28-94	17	800	24.5	6.14	7.82							
08-29-94	18	900	24.9	6.20	7.79							
08-30-94	19	900	24.3	6.20	7.85							
08-31-94	20	800	24.5	6.26	7.93							
09-01-94	21	1100	24.8	6.22	8.49	27.2	102.6	276	0.00	0.00	a	a
09-02-94	22	900	24.5	6.21	8.37							
09-03-94	23	815	24.0	6.25	7.73							
09-04-94	24	810	24.1	6.35	8.14							
09-05-94	25	1100	24.3	6.18	8.40							
09-06-94	26	900	24.2	6.16	8.40							
09-07-94	27	800	24.2	6.20	8.50							
09-08-94	28	1100	24.1	6.20	8.63	27.2	85.5	276	0.00	0.00	0.000	0.00000
09-09-94	29	900	24.2	6.15	9.20							
09-10-94	30	900	24.2	6.25	8.63							
09-11-94	31	800	23.8	6.17	8.26							
09-12-94	32	500	24.0	6.23	7.84							

09-13-94	33	700	24.1	6.19	8.48							
09-14-94	34	1400	24.7	6.18	8.20							
09-15-94	35	1300	24.7	6.19	8.02							
09-16-94	36	1200	24.7	6.10	8.00	27.2	85.5	278	0.00	0.00	0.000	0.00000
09-17-94	37	820	24.3	6.28	7.64							
09-18-94	38	830	24.4	6.26	7.96							
09-19-94	39	1000	24.5	6.17	8.07							
09-20-94	40	1000	24.5	6.23	8.17							
09-21-94	41	1000	24.7	6.23	8.12							
09-22-94	42	900	24.8	6.24	8.01	27.2	85.5	281	0.00	0.00	a	a
09-23-94	43	1000	24.8	6.29	8.42							
09-24-94	44	845	24.5	6.22	7.91							
09-25-94	45	1300	24.8	a	8.19							
09-26-94	46	900	24.6	6.08	7.84							
09-27-94	47	800	24.6	6.11	8.27							
09-28-94	48	1000	24.4	5.97	7.85	27.2	85.5	258	a	a	a	a
09-29-94	49	1030	24.8	6.63	7.70							
09-30-94	50	1030	24.1	6.30	8.33							
10-01-94	51	900	23.9	6.26	7.59							
10-02-94	52	915	24.1	6.24	8.59							
10-03-94	53	1100	23.9	6.19	8.62							
10-04-94	54	1100	23.8	6.22	8.37							
10-05-94	55	1000	24.2	6.20	8.55							
10-06-94	56	800	24.0	6.21	8.02	27.2	85.5	268	0.00	0.00	a	a
10-07-94	57	1100	24.6	6.20	8.59						0.030	0.00003
10-08-94	58	1100	24.8	6.24	8.82							
10-09-94	59	1100	24.8	6.24	8.28							
10-10-94	60	1000	24.5	6.24	7.98							
10-11-94	61	1600	24.7	6.29	7.72							
10-12-94	62	900	24.2	6.30	8.31							
10-13-94	63	1300	24.9	6.34	8.00	27.2	85.5	275	0.00	0.00	a	a
10-14-94	64	1300	25.9	6.32	7.12							
10-15-94	65	900	25.3	6.31	7.54							
10-16-94	66	900	24.8	6.32	7.77							
10-17-94	67	1000	26.2	6.45	5.83							
10-18-94	68	800	24.7	6.20	7.47							
10-19-94	69	900	24.8	6.37	7.86							
10-20-94	70	900	24.5	6.30	7.65	27.2	85.5	271	0.00	0.00	0.022	0.00002
10-21-94	71	900	23.0	6.28	8.67							
10-22-94	72	800	24.2	6.36	8.18							
10-23-94	73	900	24.7	6.32	8.53							
10-24-94	74	900	24.5	6.32	8.08							
10-25-94	75	900	24.6	6.33	7.98							
10-26-94	76	800	24.4	6.37	8.16							

10-27-94	77	1100	24.7	6.38	8.36	34.0	85.5	265	0.00	0.00	0.019	0.00003
10-28-94	78	1000	24.4	6.38	8.43							
10-29-94	79	900	24.4	6.36	7.74							
10-30-94	80	900	24.7	6.35	8.48							
10-31-94	81	1000	24.8	6.32	8.82							
11-01-94	82	1100	25.2	6.27	8.58							
11-02-94	83	1000	24.8	6.30	8.63							
11-03-94	84	1000	24.6	6.30	7.70							
11-04-94	85	1000	24.8	6.28	7.86	34.0	85.5	276	0.00	0.00	0.055	0.00006
11-05-94	86	1000	24.8	6.51	8.83							
11-06-94	87	1000	25.0	6.30	8.51							
11-07-94	88	700	24.5	6.32	8.80							
11-08-94	89	1000	24.5	6.35	8.84							
11-09-94	90	1000	24.8	6.36	8.63							
11-10-94	91	1100	24.7	6.33	7.64							
11-11-94	92	900	24.2	6.30	7.89	34.0	85.5	277	0.00	0.00	0.049	0.00005
11-12-94	93	845	23.9	6.47	7.59							
11-13-94	94	830	24.2	6.47	8.10							
11-14-94	95	1000	24.4	6.30	8.32							
11-15-94	96	900	24.7	6.31	8.30							
11-16-94	97	900	24.7	6.33	7.82	27.2	85.5	260	0.00	0.00	0.038	0.00005
11-17-94	98	900	24.8	6.37	7.93							
11-18-94	99	900	25.0	6.31	7.76							
11-19-94	100	800	24.8	6.35	7.78							
11-20-94	101	900	24.7	6.32	8.03							
11-21-94	102	600	24.6	6.34	8.08							
11-22-94	103	600	24.8	6.36	7.87							
11-23-94	104	800	22.4	6.62	8.54	40.8	85.5	254	0.00	0.00	0.038	0.00007
11-24-94	105	730	22.8	6.30	7.65							
11-25-94	106	1020	22.6	6.29	8.99							
11-26-94	107	1000	22.8	6.21	8.26							
11-27-94	108	900	22.0	6.24	8.48							
11-28-94	109	900	22.9	6.20	8.35							
11-29-94	110	900	22.2	6.04	8.44							
11-30-94	111	900	22.2	6.05	8.23							
12-01-94	112	900	21.8	6.04	8.25	27.2	85.5	244	0.00	0.00	0.048	0.00002
12-02-94	113	1000	26.7	6.29	7.79							
12-03-94	114	1000	24.9	6.27	7.48							
12-04-94	115	1100	25.1	6.17	7.79							
12-05-94	116	900	25.3	6.28	7.46							
12-06-94	117	900	25.3	6.85	7.55							
12-07-94	118	800	25.2	6.92	8.33							
12-08-94	119	1100	25.3	6.91	7.47	68.0	85.5	317	0.00	0.00	0.038	0.00018
12-09-94	120	1000	25.1	6.91	7.34							

12-10-94	121	1300	25.4	6.90	7.18							
12-11-94	122	900	25.4	6.87	7.38							
12-12-94	123	900	24.7	6.92	7.80							
12-13-94	124	900	24.5	6.92	7.97							
12-14-94	125	900	24.5	6.89	7.92							
12-15-94	126	800	25.2	6.95	7.84	61.2	68.4	311	0.00	0.00	0.062	0.00032
12-16-94	127	1100	25.1	6.93	7.40							
12-17-94	128	845	25.3	6.96	7.29							
12-18-94	129	930	25.0	6.89	7.08							
12-19-94	130	1000	25.4	6.84	7.15							
12-20-94	131	1100	25.2	6.87	7.45							
12-21-94	132	1000	25.1	6.82	7.41	61.2	68.4	304	0.00	0.00	0.110	0.00041
12-22-94	133	800	24.7	6.94	7.38							
12-23-94	134	1000	25.0	6.88	7.31							
12-24-94	135	900	25.1	6.90	7.49							
12-25-94	136	700	24.2	7.01	7.72							
12-26-94	137	1000	24.2	6.84	7.57							
12-27-94	138	1100	24.7	6.98	7.50							
12-28-94	139	1000	24.8	6.96	8.00							
12-29-94	140	900	24.8	6.96	7.26	68.0	85.5	320	0.00	0.00	0.046	0.00023
12-30-94	141	1000	24.6	6.90	7.28							
12-31-94	142	1000	24.7	6.81	7.29							
01-01-95	143	1100	25.1	6.95	7.25							
01-02-95	144	1000	24.9	6.98	7.27							
01-03-95	145	1100	24.6	6.94	7.81							
01-04-95	146	900	24.6	7.00	7.40							
01-05-95	147	1100	24.2	6.97	8.46	68.0	68.4	318	0.00	0.00	0.032	0.00016
01-06-95	148	1000	23.6	6.97	8.15							
01-07-95	149	1130	24.0	6.84	8.71							
01-08-95	150	1030	23.5	7.02	8.68							
01-09-95	151	1000	23.5	6.94	8.99							
01-10-95	152	1000	24.1	6.99	7.66							
01-11-95	153	1000	24.2	7.15	7.11							
01-12-95	154	1100	24.4	7.00	6.96	68.0	85.5	327	0.00	0.00	0.026	0.00014
01-13-95	155	1000	24.5	7.04	6.50							
01-14-95	156	900	25.0	6.96	7.18							
01-15-95	157	800	25.3	6.85	7.35							
01-16-95	158	1030	25.1	7.01	7.34							
01-17-95	159	1000	24.7	6.94	7.66							
01-18-95	160	1000	24.6	7.08	6.96							
01-19-95	161	1000	24.6	7.14	7.25	68.0	85.5	314	0.00	0.00	a	a
01-20-95	162	1000	24.8	6.97	7.20							
01-21-95	163	1000	25.0	7.01	6.92							
01-22-95	164	1100	24.7	7.12	6.90							

01-23-95	165	600	24.3	7.09	7.53							
01-24-95	166	1000	24.7	6.90	8.14							
01-25-95	167	1100	22.5	6.90	7.37							
01-26-95	168	1100	23.1	6.92	7.34	74.8	85.5	318	0.00	0.00	0.010	0.00004
01-27-95	169	1000	23.0	6.94	7.34							
01-28-95	170	830	23.9	6.98	7.13							
01-29-95	171	900	23.4	6.89	7.64							
01-30-95	172	1000	23.9	6.84	7.49							
01-31-95	173	1000	22.5	6.94	7.89							
02-01-95	174	1000	25.2	6.86	7.20							
02-02-95	175	900	25.3	6.93	7.58	74.8	85.5	324	0.00	0.00	0.026	0.00013
02-03-95	176	930	25.1	6.93	7.43							
02-04-95	177	1000	25.3	6.84	7.55							
02-05-95	178	1200	24.3	6.83	7.54							
02-06-95	179	930	21.9	6.83	8.25							
02-07-95	180	900	23.0	6.93	8.07							
02-08-95	181	900	23.1	6.76	7.90							
02-09-95	182	900	21.5	6.84	8.55	40.8	85.5	294	0.00	0.00	0.019	0.00006
02-10-95	183	900	22.3	6.55	8.19							
02-11-95	184	900	21.7	6.38	8.63							
02-12-95	185	1200	21.5	6.22	8.85							
02-13-95	186	900	20.5	6.37	9.03							
02-14-95	187	900	20.4	6.37	8.83							
02-15-95	188	900	21.2	6.32	8.81							
02-16-95	189	900	21.4	6.30	8.75	27.2	85.5	292	0.00	0.00	0.025	0.00002
02-17-95	190	900	20.9	6.30	8.49							
02-18-95	191	1100	20.7	6.28	9.12							
02-19-95	192	1400	21.6	6.29	8.96							
02-20-95	193	1000	20.9	6.22	8.82							
02-21-95	194	1000	21.1	6.32	8.78							
02-22-95	195	900	20.9	6.29	8.55							
02-23-95	196	1000	22.7	6.30	8.48	27.2	85.5	299	0.00	0.00	0.033	0.00003
02-24-95	197	1000	22.0	6.35	8.30							
02-25-95	198	1000	21.5	6.36	8.52							
02-26-95	199	1800	21.9	6.39	8.60							
02-27-95	200	900	21.8	6.38	8.41							
02-28-95	201	900	22.5	6.28	8.38							
03-01-95	202	900	22.6	6.27	8.28							
03-02-95	203	900	22.5	6.39	8.40	34.0	85.5	373	0.00	0.00	0.011	0.00001
03-03-95	204	900	22.0	6.38	8.29							
03-04-95	205	1000	22.9	6.40	8.26							
03-05-95	206	1015	22.8	6.44	8.20							
03-06-95	207	900	23.1	6.29	8.26							
03-07-95	208	900	23.6	6.37	8.03							

03-08-95	209	900	23.5	6.39	7.94							
03-09-95	210	1000	24.4	6.35	7.76	34.0	85.5	300	0.00	0.00	0.015	0.00002
03-10-95	211	900	25.7	6.39	7.59							
03-11-95	212	1100	25.0	6.32	7.75							
03-12-95	213	1800	25.8	6.30	7.49							
03-13-95	214	900	25.0	6.36	7.53							
03-14-95	215	900	25.2	6.34	7.85							
03-15-95	216	900	25.1	6.33	7.69							
03-16-95	217	900	25.7	6.31	7.90	40.8	85.5	271	0.00	0.00	0.010	0.00001
03-17-95	218	900	25.8	6.31	7.57							
03-18-95	219	1000	25.2	6.38	7.47							
03-19-95	220	1600	26.4	6.36	7.54							
03-20-95	221	900	25.7	6.35	7.54							
03-21-95	222	900	25.8	6.33	7.26							
03-22-95	223	900	25.7	6.29	7.47							
03-23-95	224	1100	25.8	6.28	7.24	40.8	85.5	298	0.00	0.00	a	a
03-24-95	225	900	25.7	6.35	6.50							
03-25-95	226	915	26.1	6.44	6.98							
03-26-95	227	900	26.2	6.46	7.57							
03-27-95	228	900	26.2	6.32	7.06							
03-28-95	229	900	25.4	6.27	6.81							
03-29-95	230	900	25.2	6.32	6.80							
03-30-95	231	900	25.2	6.34	6.58	34.0	85.5	282	0.00	0.00	0.054	0.00005
03-31-95	232	900	25.4	6.30	6.41							
04-01-95	233	900	25.1	6.42	6.99							
04-02-95	234	1000	25.1	6.39	7.50							
04-03-95	235	900	24.7	6.34	7.46							
04-04-95	236	900	25.2	6.42	6.96							
04-05-95	237	900	24.7	6.38	6.99							
04-06-95	238	900	25.0	6.42	7.03	27.2	85.5	291	0.00	0.00	0.055	0.00006
04-07-95	239	900	25.2	6.39	6.85							
04-08-95	240	1100	25.4	6.38	6.92							
04-09-95	241	1300	25.7	6.38	7.30							
04-10-95	242	900	25.3	6.35	6.60							
04-11-95	243	900	25.5	6.37	7.16							
04-12-95	244	900	25.8	6.42	7.02							
04-13-95	245	1100	25.7	6.46	6.78	34.0	85.5	306	0.00	0.00	0.032	0.00004
04-14-95	246	900	25.5	6.38	6.52							
04-15-95	247	1400	25.8	6.45	7.25							
04-16-95	248	1100	25.8	6.40	7.20							
04-17-95	249	900	25.6	6.45	7.14							
04-18-95	250	900	25.5	6.41	7.43							
04-19-95	251	900	25.7	6.46	7.49							
04-20-95	252	900	25.6	6.38	7.24	34.0	68.4	280	0.00	0.00	a	a

04-21-95	253	900	25.8	6.44	7.04							
04-22-95	254	1200	26.2	6.44	7.04							
04-23-95	255	2000	25.5	6.42	7.26							
04-24-95	256	900	24.9	6.50	7.15							
04-25-95	257	900	24.9	6.42	6.79							
04-26-95	258	900	24.6	6.50	6.97							
04-27-95	259	900	25.0	6.44	6.86	34.0	85.5	279	0.00	0.00	a	a
04-28-95	260	900	25.1	6.40	6.93							
04-29-95	261	1100	25.1	6.44	6.55							
04-30-95	262	1600	25.1	6.42	7.25							
05-01-95	263	900	25.0	6.49	7.66							
05-02-95	264	900	24.9	6.46	8.08							
05-03-95	265	900	24.7	6.48	7.23							
05-04-95	266	900	24.9	6.45	7.40	34.0	85.5	288	0.00	0.00	a	a
05-05-95	267	900	25.4	6.48	7.12							
05-06-95	268	830	25.4	6.48	7.09							
05-07-95	269	900	25.4	6.52	6.94							
05-08-95	270	900	25.4	6.45	7.10							
05-09-95	271	900	25.3	6.47	6.96							
05-10-95	272	900	25.9	6.35	7.11							
MEAN			24.4		7.79	40.1	84.2	289			0.040	0.00008
MINIMUM			20.4	5.88	5.83	27.2	68.4	244	0.00	0.00	0.000	0.00000
MAXIMUM			26.7	7.15	9.20	74.8	102.6	373	0.00	0.00	0.139	0.00041
Std Dev			1.18		0.607	16.27	6.05	25.6			0.0317	0.000096
N			272	271	272	38	38	38	38	38	29	29

[a] Data not available; analytical instrument would not calibrate.

TANK No. 33
CEHR LABORATORY CONTROL FISH [a]
NO DEN EXPOSURE

Date	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
07-27-94	24.6							
07-28-94	24.8							
07-29-31	24.9	7.98	8.01					
07-30-94	24.8							
07-31-94	24.8							
08-01-94	24.9							
08-02-94	25.1	7.76	7.75				<0.02	<0.001
08-03-94	24.9							
08-04-94	25.1							
08-05-94	25.1							
08-06-94	24.1							
08-07-94	24.4							
08-08-94	24.7							
08-09-94	24.3							
08-10-94	24.7							
08-11-94	24.4							
08-12-94	24.6							
08-13-94	24.5							
08-14-94	24.5							
08-15-94	24.9							
08-16-94	24.9							

08-17-94	25.0	7.92	7.70			
08-18-94	25.0					
08-19-94	25.1					
08-20-94	24.9					
08-21-94	24.9					
08-22-94	25.0					
08-23-94	25.0					
08-24-94	25.0					
08-25-94	24.9	8.16	8.07			
08-26-94	25.0					
08-27-94	24.9					
08-28-94	24.9					
08-29-94	24.9					
08-30-94	24.9					
08-31-94	24.9					
09-01-94						
09-02-94	24.8	7.84	8.08	502		
09-03-94						
09-04-94						
09-05-94						
09-06-94						
09-07-94						
09-08-94	24.9	7.96	7.98	493		
09-09-94						
09-10-94						
09-11-94						
09-12-94						
09-13-94						
09-14-94						
09-15-94	24.7	7.90	7.89	503	<0.02	0.001
09-16-94						
09-17-94						
09-18-94						

09-19-94						
09-20-94						
09-21-94						
09-22-94	25.0	8.22	7.80	507		
09-23-94						
09-24-94						
09-25-94						
09-26-94						
09-27-94						
09-28-94						
09-29-94	24.9	8.17	7.98	505		
09-30-94						
10-01-94						
10-02-94						
10-03-94						
10-04-94						
10-05-94						
10-06-94	24.8	7.92	8.03	487	<0.02	<0.001
10-07-94						
10-08-94						
10-09-94						
10-10-94						
10-11-94						
10-12-94						
10-13-94	24.9	7.80	7.79	484		
10-14-94						
10-15-94						
10-16-94						
10-17-94						
10-18-94						
10-19-94						
10-20-94	24.8	7.75	7.82	488		
10-21-94						

10-22-94						
10-23-94						
10-24-94						
10-25-94						
10-26-94						
10-27-94	25.0	8.02	7.92	490		
10-28-94						
10-29-94						
10-30-94						
10-31-94						
11-01-94						
11-02-94						
11-03-94	24.9	7.97	7.99	487		
11-04-94						
11-05-94						
11-06-94						
11-07-94						
11-08-94						
11-09-94						
11-10-94	24.8	7.96	7.80	485		
11-11-94						
11-12-94						
11-13-94						
11-14-94						
11-15-94						
11-16-94						
11-17-94	24.9	8.16	7.73			
11-18-94						
11-19-94						
11-20-94						
11-21-94						
11-22-94	24.9	8.03	7.68		0.08	0.006
11-23-94						

11-24-94			
11-25-94			
11-26-94			
11-27-94			
11-28-94			
11-29-94			
11-30-94			
12-01-94	24.9	7.94	7.74
12-02-94			
12-03-94			
12-04-94			
12-05-94			
12-06-94			
12-07-94			
12-08-94	25.0	7.98	7.79
12-09-94			
12-10-94			
12-11-94			
12-12-94			
12-13-94			
12-14-94			
12-15-94	25.1	7.84	7.72
12-16-94			
12-17-94			
12-18-94			
12-19-94			
12-20-94			
12-21-94			
12-22-94	24.8	7.99	7.62
12-23-94			
12-24-94			
12-25-94			
12-26-94			

12-27-94					
12-28-94					
12-29-94	24.9	8.02	7.55	0.02	0.001
12-30-94					
12-31-94					
01-01-95					
01-02-95					
01-03-95					
01-04-95					
01-05-95					
01-06-95	24.9	7.99	7.73		
01-07-95					
01-08-95					
01-09-95					
01-10-95					
01-11-95					
01-12-95	24.8	7.94	7.76	0.02	0.001
01-13-95					
01-14-95					
01-15-95					
01-16-95					
01-17-95					
01-18-95					
01-19-95	24.9	8.12	7.80		
01-20-95					
01-21-95					
01-22-95					
01-23-95					
01-24-95					
01-25-95					
01-26-95					
01-27-95	24.9	8.21	7.93		
01-28-95					

01-29-95					
01-30-95					
01-31-95					
02-01-95					
02-02-95	25.0	8.22	7.84		
02-03-95					
02-04-95					
02-05-95					
02-06-95					
02-07-95					
02-08-95					
02-09-95	24.9	7.99	7.68		
02-10-95					
02-11-95					
02-12-95					
02-13-95					
02-14-95					
02-15-95					
02-16-95	24.7	7.92	8.12		
02-17-95					
02-18-95					
02-19-95					
02-20-95					
02-21-95					
02-22-95					
02-23-95	25.0	8.08	7.50	0.02	0.002
02-24-95					
02-25-95					
02-26-95					
02-27-95					
02-28-95					
03-01-95					
03-02-95	25.0	8.05	7.62	0.02	0.001

03-03-95						
03-04-95						
03-05-95						
03-06-95						
03-07-95						
03-08-95						
03-09-95	24.7	7.94	8.20	580		
03-10-95						
03-11-95						
03-12-95						
03-13-95						
03-14-95						
03-15-95						
03-16-95	25.1	8.00	7.50	587		
03-17-95						
03-18-95						
03-19-95						
03-20-95						
03-21-95						
03-22-95	24.8	7.79	7.60	566		
03-23-95						
03-24-95						
03-25-95						
03-26-95						
03-27-95						
03-28-95						
03-29-95						
03-30-95	25.0	8.10	7.60	501		
03-31-95						
04-01-95						
04-02-95						
04-03-95						
04-04-95	24.6	8.08	8.10	519	0.02	0.001

04-05-95				
04-06-95				
04-07-95				
04-08-95				
04-09-95				
04-10-95				
04-11-95				
04-12-95				
04-13-95	25.0	8.04	8.00	489
04-14-95				
04-15-95				
04-16-95				
04-17-95				
04-18-95				
04-19-95				
04-20-95	24.9	8.00	7.60	470
04-21-95				
04-22-95				
04-23-95				
04-24-95				
04-25-95				
04-26-95				
04-27-95	24.7	8.00	8.00	470
04-28-95				
04-29-95				
04-30-95				
05-01-95				
05-02-95				
05-03-95				
05-04-95	24.9	7.79	7.20	500
05-05-95				
05-06-95				
05-07-95				

05-08-95	24.9	7.83	7.40	470		
05-09-95						
05-10-95						
05-11-95						
05-12-95						
MEAN	24.8		7.42	504		
MINIMUM	24.1	7.75	7.20	470	<0.0	<0.001
MAXIMUM	25.1	8.22	8.20	587	0.08	0.006
Std Dev	0.19		0.206	32.6		
N	73	41	41	21	9	9

[a]Temperature data for the period July 27, 1994 to August 18, 1994 and August 19, 1994 to August 31, 1994 were taken from CEHR's Daily Record for Medaka Fry log and Daily Record for Adult Medaka log, respectively. Temperatures on July 29, 1994, August 2, 1994, August 18, 1994, and August 24, 1994 were taken from CEHR'S Water Quality Data Record log. All other data were taken from CEHR's Water Quality Data Record log (USACEHR, 1994/1995c). A blank space indicates that no measurement was taken.

TANK No. 34
CEHR LABORATORY CONTROL FISH [a]
NO DEN EXPOSURE

Date	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
07-27-94	24.6							
07-28-94	24.8							
07-29-31	24.9	7.97	8.07					
07-30-94	24.9							
07-31-94	24.9							
08-01-94	24.9							
08-02-94	25.1	7.77	7.78				0.02	0.001
08-03-94	24.9							
08-04-94	25.1							
08-05-94	25.0							
08-06-94	24.1							
08-07-94	24.3							
08-08-94	24.7							
08-09-94	24.3							
08-10-94	24.7							
08-11-94	24.4							
08-12-94	24.6							
08-13-94	24.5							
08-14-94	24.5							
08-15-94	24.8							
08-16-94	24.8							

08-17-94	24.9	7.94	7.66			
08-18-94	24.9					
08-19-94	25.0					
08-20-94	24.8					
08-21-94	24.8					
08-22-94	24.9					
08-23-94	24.9					
08-24-94	24.9					
08-25-94	24.8	8.18	7.98		<0.02	<0.002
08-26-94	24.9					
08-27-94	24.8					
08-28-94	24.8					
08-29-94	24.8					
08-30-94	24.8					
08-31-94	24.8					
09-01-94						
09-02-94	24.9	8.13	7.82	502		
09-03-94						
09-04-94						
09-05-94						
09-06-94						
09-07-94						
09-08-94	24.8	7.96	7.90	493		
09-09-94						
09-10-94						
09-11-94						
09-12-94						
09-13-94						
09-14-94						
09-15-94	24.6	7.89	7.77	503	0.04	0.002
09-16-94						
09-17-94						
09-18-94						

09-19-94						
09-20-94						
09-21-94						
09-22-94	24.9	8.25	7.82	507		
09-23-94						
09-24-94						
09-25-94						
09-26-94						
09-27-94						
09-28-94						
09-29-94	24.9	8.27	8.09	505		
09-30-94						
10-01-94						
10-02-94						
10-03-94						
10-04-94						
10-05-94						
10-06-94	24.7	7.82	8.02	487	<0.02	<0.001
10-07-94						
10-08-94						
10-09-94						
10-10-94						
10-11-94						
10-12-94						
10-13-94	24.8	7.93	7.92	484		
10-14-94						
10-15-94						
10-16-94						
10-17-94						
10-18-94						
10-19-94						
10-20-94	24.8	7.82	7.86	488		
10-21-94						

10-22-94						
10-23-94						
10-24-94						
10-25-94						
10-26-94						
10-27-94	24.9	8.16	8.01	490		
10-28-94						
10-29-94						
10-30-94						
10-31-94						
11-01-94						
11-02-94						
11-03-94	24.8	7.98	7.71	487		
11-04-94						
11-05-94						
11-06-94						
11-07-94						
11-08-94						
11-09-94						
11-10-94	24.8	8.13	7.68	485		
11-11-94						
11-12-94						
11-13-94						
11-14-94						
11-15-94						
11-16-94						
11-17-94	24.9	8.18	7.72			
11-18-94						
11-19-94						
11-20-94						
11-21-94						
11-22-94	24.9	8.05	8.00		0.08	0.006
11-23-94						

11-24-94			
11-25-94			
11-26-94			
11-27-94			
11-28-94			
11-29-94			
11-30-94			
12-01-94	24.9	7.99	7.88
12-02-94			
12-03-94			
12-04-94			
12-05-94			
12-06-94			
12-07-94			
12-08-94	24.9	8.04	7.72
12-09-94			
12-10-94			
12-11-94			
12-12-94			
12-13-94			
12-14-94			
12-15-94	25.0	7.76	7.80
12-16-94			
12-17-94			
12-18-94			
12-19-94			
12-20-94			
12-21-94			
12-22-94	24.9	8.00	7.65
12-23-94			
12-24-94			
12-25-94			
12-26-94			

12-27-94					
12-28-94					
12-29-94	24.8	7.95	7.74	0.04	0.002
12-30-94					
12-31-94					
01-01-95					
01-02-95					
01-03-95					
01-04-95					
01-05-95					
01-06-95	24.8	8.03	7.67		
01-07-95					
01-08-95					
01-09-95					
01-10-95					
01-11-95					
01-12-95	24.8	7.98	7.52	0.02	0.001
01-13-95					
01-14-95					
01-15-95					
01-16-95					
01-17-95					
01-18-95					
01-19-95	24.8	8.06	7.65		
01-20-95					
01-21-95					
01-22-95					
01-23-95					
01-24-95					
01-25-95					
01-26-95					
01-27-95	24.8	8.04	7.90		
01-28-95					

01-29-95					
01-30-95					
01-31-95					
02-01-95					
02-02-95	25.0	8.07	7.82		
02-03-95					
02-04-95					
02-05-95					
02-06-95					
02-07-95					
02-08-95					
02-09-95	24.9	7.86	7.71		
02-10-95					
02-11-95					
02-12-95					
02-13-95					
02-14-95					
02-15-95					
02-16-95	24.7	7.70	8.07		
02-17-95					
02-18-95					
02-19-95					
02-20-95					
02-21-95					
02-22-95					
02-23-95	24.9	8.07	7.64	0.04	0.002
02-24-95					
02-25-95					
02-26-95					
02-27-95					
02-28-95					
03-01-95					
03-02-95	25.0	7.94	7.59	0.04	0.002

03-03-95						
03-04-95						
03-05-95						
03-06-95						
03-07-95						
03-08-95						
03-09-95	24.7	7.95	8.10	580		
03-10-95						
03-11-95						
03-12-95						
03-13-95						
03-14-95						
03-15-95						
03-16-95	25.1	8.01	7.60	589		
03-17-95						
03-18-95						
03-19-95						
03-20-95						
03-21-95						
03-22-95	24.8	7.80	7.60	576		
03-23-95						
03-24-95						
03-25-95						
03-26-95						
03-27-95						
03-28-95						
03-29-95						
03-30-95	25.0	7.88	7.60	501		
03-31-95						
04-01-95						
04-02-95						
04-03-95						
04-04-95	24.7	7.96	8.00	519	0.02	0.001

04-05-95				
04-06-95				
04-07-95				
04-08-95				
04-09-95				
04-10-95				
04-11-95				
04-12-95				
04-13-95	25.0	7.98	7.50	489
04-14-95				
04-15-95				
04-16-95				
04-17-95				
04-18-95				
04-19-95				
04-20-95	24.9	8.03	7.70	482
04-21-95				
04-22-95				
04-23-95				
04-24-95				
04-25-95				
04-26-95				
04-27-95	24.8	8.01	7.90	470
04-28-95				
04-29-95				
04-30-95				
05-01-95				
05-02-95				
05-03-95				
05-04-95	24.9	7.90	7.70	504
05-05-95				
05-06-95				
05-07-95				

05-08-95	24.9	7.92	7.60	465		
05-09-95						
05-10-95						
05-11-95						
05-12-95						
MEAN	24.8		7.79	505		
MINIMUM	24.1	7.70	7.50	465	<0.02	<0.001
MAXIMUM	25.1	8.27	8.10	589	0.08	0.006
Std Dev	0.18		0.166	33.6		
N	73	41	41	21	10	10

[a]Temperature data for the period July 27, 1994 to August 18, 1994 and August 19, 1994 to August 31, 1994 were taken from CEHR's Daily Record for Medaka Fry log and Daily Record for Adult Medaka log, respectively. Temperatures on July 29, 1994, August 2, 1994, August 18, 1994, and August 24, 1994 were taken from CEHR'S Water Quality Data Record log. All other data were taken from CEHR's Water Quality Data Record log (USACEHR, 1994/1995c). A blank space indicates that no measurement was taken.

TANK No. 35
CEHR LABORATORY CONTROL FISH [a]
DEN EXPOSURE: 10 mg/L

Date	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
07-27-94	24.6							
07-28-94	24.8							
07-29-94	24.8	7.90	8.02					
07-30-94	24.9							
07-31-94	24.8							
08-01-94	24.9							
08-02-94	25.1	7.77	7.72				<0.02	<0.001
08-03-94	24.9							
08-04-94	25.1							
08-05-94	25.0							
08-06-94	24.1							
08-07-94	24.3							
08-08-94	24.6							
08-09-94	24.2							
08-10-94	24.7							
08-11-94	24.4							
08-12-94	24.6							
08-13-94	24.7							
08-14-94	24.7							
08-15-94	24.9							
08-16-94	24.9							

08-17-94	25.0	7.88	7.63	102	152	461	0.08	0.004
08-18-94	25.0							
08-19-94	25.1							
08-20-94	24.9							
08-21-94	24.9							
08-22-94	25.0							
08-23-94	25.0							
08-24-94	25.0							
08-25-94	24.9	8.14	7.99	102	140	464		
08-26-94	25.0							
08-27-94	24.9							
08-28-94	24.9							
08-29-94	24.9							
08-30-94	24.9							
08-31-94	24.9							
09-01-94	24.9	8.10		112	160			
09-02-94	24.7	7.86	8.00			502		
09-03-94	24.7							
09-04-94	24.8							
09-05-94	24.8							
09-06-94	24.7							
09-07-94	24.7							
09-08-94	24.9	8.22	7.98	110	160	495		
09-09-94	24.9							
09-10-94	24.9							
09-11-94	24.9							
09-12-94	25.0							
09-13-94	24.9							
09-14-94	25.1							
09-15-94	24.7	8.13	7.84	110	160	503	<0.02	<0.002
09-16-94	24.8							
09-17-94	24.9							
09-18-94	24.7							

09-19-94	24.8							
09-20-94	25.0							
09-21-94	25.0							
09-22-94	25.1	8.26	7.76	110	160	507		
09-23-94	25.0							
09-24-94	25.1							
09-25-94	25.2							
09-26-94	25.3							
09-27-94	24.3							
09-28-94	25.0							
09-29-94	25.0	8.17	7.94	110	156	505		
09-30-94	24.7							
10-01-94	24.8							
10-02-94	24.8							
10-03-94	25.2							
10-04-94	24.6							
10-05-94	24.5							
10-06-94	24.8	8.01	8.04	110	152	487	<0.02	<0.001
10-07-94	24.8							
10-08-94	24.8							
10-09-94	25.0							
10-10-94	25.1							
10-11-94	25.1							
10-12-94	25.1							
10-13-94	24.9	8.00	7.94			484		
10-14-94	24.9			108	156			
10-15-94	24.9							
10-16-94	24.7							
10-17-94	24.8							
10-18-94	24.8							
10-19-94	24.9							
10-20-94	24.9	7.76	7.85	110	160	488		
10-21-94	24.9							

10-22-94	25.0							
10-23-94	24.9							
10-24-94	24.9							
10-25-94	24.9							
10-26-94	25.0							
10-27-94	25.0	8.01	7.91	110	152	490		
10-28-94	25.1							
10-29-94	25.2							
10-30-94	25.2							
10-31-94	25.2							
11-01-94	25.1							
11-02-94	25.0							
11-03-94	24.9	7.94	7.96	110	152	487		
11-04-94	24.9							
11-05-94	25.0							
11-06-94	25.1							
11-07-94	25.1							
11-08-94	25.1							
11-09-94	24.8							
11-10-94	24.8	7.96	7.72	112	148	485		
11-11-94	24.9							
11-12-94	24.9							
11-13-94	24.9							
11-14-94	24.9							
11-15-94	25.0							
11-16-94	24.7							
11-17-94	25.0	8.30	7.68	116	148	495		
11-18-94	25.1							
11-19-94	25.0							
11-20-94	25.0							
11-21-94	24.9							
11-22-94	24.9	8.24	8.07	108	152	451	0.08	0.008
11-23-94	25.1							

11-24-94	25.1					
11-25-94	25.0					
11-26-94	25.0					
11-27-94	24.8					
11-28-94	25.0					
11-29-94	24.8					
11-30-94	25.1					
12-01-94	25.0	8.10	7.95	106	152	481
12-02-94	24.9					
12-03-94	25.0					
12-04-94	25.1					
12-05-94	25.1					
12-06-94	25.1					
12-07-94	25.0					
12-08-94	25.0	8.15	7.76	106	152	476
12-09-94	25.0					
12-10-94	25.2					
12-11-94	25.1					
12-12-94	25.0					
12-13-94	25.0					
12-14-94	24.9					
12-15-94	25.1	7.96	7.66	108	148	484
12-16-94	25.1					
12-17-94	24.9					
12-18-94	25.0					
12-19-94	25.0					
12-20-94	25.0					
12-21-94	25.0					
12-22-94	24.9	8.01	7.69	108	152	458
12-23-94	25.0					
12-24-94	24.9					
12-25-94	25.0					
12-26-94	25.0					

12-27-94	24.9							
12-28-94	24.9							
12-29-94	24.9	8.06	7.82	108	148	470	0.02	0.001
12-30-94	24.9							
12-31-94	24.9							
01-01-95	24.9							
01-02-95	25.1							
01-03-95	24.9							
01-04-95	24.9							
01-05-95	24.9							
01-06-95	24.9	8.11	7.79	108	148	480		
01-07-95	24.9							
01-08-95	24.9							
01-09-95	24.9							
01-10-95	24.9							
01-11-95	24.8							
01-12-95	24.8	7.96	7.77	110	148	492	0.02	0.001
01-13-95	25.0							
01-14-95	25.0							
01-15-95	25.2							
01-16-95	25.2							
01-17-95	24.9							
01-18-95	24.8							
01-19-95	24.9	8.06	7.94	104	156	509		
01-20-95	24.9							
01-21-95	24.9							
01-22-95	24.9							
01-23-95	24.9							
01-24-95	24.9							
01-25-95	25.0							
01-26-95	25.0							
01-27-95	24.9	8.16	8.02	100	144	472		
01-28-95	24.9							

01-29-95	24.9							
01-30-95	24.9							
01-31-95	24.9							
02-01-95	24.9							
02-02-95	25.0	8.19	7.89	100	144	468		
02-03-95	25.0							
02-04-95	24.9							
02-05-95	24.9							
02-06-95	24.8							
02-07-95	24.9							
02-08-95	24.9							
02-09-95	24.9	8.05	7.88	104	152	474		
02-10-95	24.9							
02-11-95	24.9							
02-12-95	24.9							
02-13-95	24.9							
02-14-95	24.8							
02-15-95	24.8							
02-16-95	24.7	8.00	8.20	104	148	543		
02-17-95	24.8							
02-18-95	24.8							
02-19-95	24.8							
02-20-95	24.8							
02-21-95	25.0							
02-22-95	25.0							
02-23-95	25.0	8.11	7.81	100	160	562	0.02	0.001
02-24-95	25.0							
02-25-95	25.0							
02-26-95	25.1							
02-27-95	24.9							
02-28-95	25.1							
03-01-95	25.1							
03-02-95	25.1	7.98	7.84	96	156	560	0.02	0.001

03-03-95	25.1							
03-04-95	25.3							
03-05-95	25.3							
03-06-95	25.1							
03-07-95	24.9							
03-08-95	25.0							
03-09-95	24.8	7.92	8.20	100	152	580		
03-10-95	25.0							
03-11-95	25.0							
03-12-95	25.0							
03-13-95	25.0							
03-14-95	24.8							
03-15-95	25.1							
03-16-95	25.1	8.11	7.60	104	152	589		
03-17-95	25.0							
03-18-95	25.0							
03-19-95	25.1							
03-20-95	25.0							
03-21-95	25.2							
03-22-95	24.9	7.96	7.80	102	156	566		
03-23-95	24.9							
03-24-95	24.8							
03-25-95	24.9							
03-26-95	24.9							
03-27-95	25.0							
03-28-95	25.2							
03-29-95	25.2							
03-30-95	25.0	8.07	7.70	102	152	501		
03-31-95	25.2							
04-01-95	25.2							
04-02-95	25.2							
04-03-95	25.3							
04-04-95	24.6	8.08	8.10	100	152	519	0.02	0.001

04-05-95	25.1					
04-06-95	25.1					
04-07-95	25.0					
04-08-95	24.8					
04-09-95	25.1					
04-10-95	25.1					
04-11-95	25.0					
04-12-95	25.0					
04-13-95	25.0	8.09	7.80	98	140	498
04-14-95	25.0					
04-15-95	25.0					
04-16-95	25.0					
04-17-95	24.8					
04-18-95	25.0					
04-19-95	25.0					
04-20-95	24.9	8.11	7.70	96	140	470
04-21-95	25.1					
04-22-95	24.7					
04-23-95	24.6					
04-24-95	24.5					
04-25-95	24.6					
04-26-95	25.0					
04-27-95	24.8	8.02	7.80	92	140	471
04-28-95	24.9					
04-29-95	24.9					
04-30-95	24.9					
05-01-95	24.7					
05-02-95	25.0					
05-03-95	24.9					
05-04-95	24.9	7.75	7.30	96	160	500
05-05-95	25.0					
05-06-95	24.9					
05-07-95	24.9					

05-08-95	24.9	7.80	7.40	100	160	470		
05-09-95	24.9							
05-10-95	24.9							
05-11-95	25.0							
05-12-95	24.9							
MEAN	24.9		7.84	105	152	497		
MINIMUM	24.1	7.75	7.30	92	140	451	<0.02	<0.001
MAXIMUM	25.3	8.30	8.20	116	160	589	0.(	0.008
Std Dev	0.17		0.183	5.4	6.0	33.6		
N	290	42	41	39	39	39	10	10

[a]Most of the temperature data for the period July 27, 1994 to August 18, 1994 and August 19, 1994 to August 31, 1994 were taken from CEHE's Daily Record for Medaka Fry log and Daily Record for Adult Medaka log, respectively. The temperature measurements taken weekly when the general water quality measurements, were made (CEHR' s Water Quality Data Record log) are given in the table (USACEHR, 1994/1995c). A blank space indicates that no measurement was taken.

TANK No. 36
CEHR LABORATORY CONTROL FISH [a]
DEN EXPOSURE: 10 mg/L

Date	Temperature (Celcius)	pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L as CaCO3)	Conductivity (umohs/cm)	Total Ammonia-Nitrogen (mg/L)	Total Unionized Ammonia-Nitrogen (mg/L)
07-27-94	24.6							
07-28-94	24.8							
07-29-31	24.8	7.88	7.77	102	148	519		
07-30-94	24.8							
07-31-94	24.8							
08-01-94	24.9							
08-02-94	25.1	7.77	7.62				<0.02	<0.001
08-03-94	24.9							
08-04-94	25.0							
08-05-94	24.9							
08-06-94	24.0							
08-07-94	24.3							
08-08-94	24.6							
08-09-94	24.3							
08-10-94	24.6							
08-11-94	24.6							
08-12-94	24.6							
08-13-94	24.5							
08-14-94	24.5							
08-15-94	24.7							
08-16-94	24.8							

08-17-94	24.9	7.93	7.69			
08-18-94	24.9					
08-19-94	25.0					
08-20-94	24.8					
08-21-94	24.8					
08-22-94	24.9					
08-23-94	24.9					
08-24-94	24.9					
08-25-94	24.8	8.22	8.02			
08-26-94	24.9					
08-27-94	24.8					
08-28-94	24.8					
08-29-94	24.8					
08-30-94	24.8					
08-31-94	24.8					
09-01-94						
09-02-94	24.7	7.98	8.06	502		
09-03-94						
09-04-94						
09-05-94						
09-06-94						
09-07-94						
09-08-94	24.8	8.10	7.89	493	0.04	0.003
09-09-94						
09-10-94						
09-11-94						
09-12-94						
09-13-94						
09-14-94						
09-15-94	24.6	7.95	7.82	503		
09-16-94						
09-17-94						
09-18-94						

09-19-94						
09-20-94						
09-21-94						
09-22-94	24.9	8.27	7.78	507		
09-23-94						
09-24-94						
09-25-94						
09-26-94						
09-27-94						
09-28-94						
09-29-94	24.9	8.16	8.13	505		
09-30-94						
10-01-94						
10-02-94						
10-03-94						
10-04-94						
10-05-94						
10-06-94	24.8	7.90	8.06	487	<0.02	<0.001
10-07-94						
10-08-94						
10-09-94						
10-10-94						
10-11-94						
10-12-94						
10-13-94	24.8	7.60	7.93	484		
10-14-94						
10-15-94						
10-16-94						
10-17-94						
10-18-94						
10-19-94						
10-20-94	24.8	7.76	7.84	488		
10-21-94						

10-22-94						
10-23-94						
10-24-94						
10-25-94						
10-26-94						
10-27-94	24.9	8.15	7.93	490		
10-28-94						
10-29-94						
10-30-94						
10-31-94						
11-01-94						
11-02-94						
11-03-94	24.9	7.96	7.90	487		
11-04-94						
11-05-94						
11-06-94						
11-07-94						
11-08-94						
11-09-94						
11-10-94	24.8	8.09	7.72	489		
11-11-94						
11-12-94						
11-13-94						
11-14-94						
11-15-94						
11-16-94						
11-17-94	24.9	8.16	7.76			
11-18-94						
11-19-94						
11-20-94						
11-21-94						
11-22-94	24.9	8.00	7.86		0.08	0.005
11-23-94						

11-24-94			
11-25-94			
11-26-94			
11-27-94			
11-28-94			
11-29-94			
11-30-94			
12-01-94	24.9	7.92	7.85
12-02-94			
12-03-94			
12-04-94			
12-05-94			
12-06-94			
12-07-94			
12-08-94	24.9	8.03	7.84
12-09-94			
12-10-94			
12-11-94			
12-12-94			
12-13-94			
12-14-94			
12-15-94	25.0	7.87	7.69
12-16-94			
12-17-94			
12-18-94			
12-19-94			
12-20-94			
12-21-94			
12-22-94	24.9	7.87	7.37
12-23-94			
12-24-94			
12-25-94			
12-26-94			

12-27-94					
12-28-94					
12-29-94	24.8	7.94	7.69	0.02	0.001
12-30-94					
12-31-94					
01-01-95					
01-02-95					
01-03-95					
01-04-95					
01-05-95					
01-06-95	24.8	8.07	7.75		
01-07-95					
01-08-95					
01-09-95					
01-10-95					
01-11-95					
01-12-95	24.8	7.92	7.68	0.04	0.002
01-13-95					
01-14-95					
01-15-95					
01-16-95					
01-17-95					
01-18-95					
01-19-95	24.8	8.10	7.72		
01-20-95					
01-21-95					
01-22-95					
01-23-95					
01-24-95					
01-25-95					
01-26-95					
01-27-95	24.8	8.05	7.84		
01-28-95					

01-29-95					
01-30-95					
01-31-95					
02-01-95					
02-02-95	25.0	8.09	7.71		
02-03-95					
02-04-95					
02-05-95					
02-06-95					
02-07-95					
02-08-95					
02-09-95	24.9	7.86	7.88		
02-10-95					
02-11-95					
02-12-95					
02-13-95					
02-14-95					
02-15-95					
02-16-95	24.7	7.74	8.14		
02-17-95					
02-18-95					
02-19-95					
02-20-95					
02-21-95					
02-22-95					
02-23-95	25.0	8.10	7.72	0.02	0.002
02-24-95					
02-25-95					
02-26-95					
02-27-95					
02-28-95					
03-01-95					
03-02-95	25.0	7.98	7.77	0.04	0.002

03-03-95						
03-04-95						
03-05-95						
03-06-95						
03-07-95						
03-08-95						
03-09-95	24.8	7.93	8.10	580		
03-10-95						
03-11-95						
03-12-95						
03-13-95						
03-14-95						
03-15-95						
03-16-95	25.3	8.12	7.50	589		
03-17-95						
03-18-95						
03-19-95						
03-20-95						
03-21-95						
03-22-95	24.7	7.86	7.70	564		
03-23-95						
03-24-95						
03-25-95						
03-26-95						
03-27-95						
03-28-95						
03-29-95						
03-30-95	25.1	7.83	7.20	502		
03-31-95						
04-01-95						
04-02-95						
04-03-95						
04-04-95	24.7	7.82	7.60	519	0.02	0.001

04-05-95				
04-06-95				
04-07-95				
04-08-95				
04-09-95				
04-10-95				
04-11-95				
04-12-95				
04-13-95	25.0	7.92	7.50	490
04-14-95				
04-15-95				
04-16-95				
04-17-95				
04-18-95				
04-19-95				
04-20-95	25.0	7.78	7.50	480
04-21-95				
04-22-95				
04-23-95				
04-24-95				
04-25-95				
04-26-95				
04-27-95	24.8	8.17	8.10	471
04-28-95				
04-29-95				
04-30-95				
05-01-95				
05-02-95				
05-03-95				
05-04-95	24.9	7.72	7.20	501
05-05-95				
05-06-95				
05-07-95				

05-08-95	24.9	7.80	7.40			462		
05-09-95								
05-10-95								
05-11-95								
05-12-95								
MEAN	24.8		7.76			505		
MINIMUM	24.0	7.60	7.20	102	148	462	<0.02	<0.001
MAXIMUM	25.3	8.27	8.14	102	148	589	0.08	0.005
Std Dev	0.19		0.226			31.9		
N	73	41	41	1	1	22	9	9

[a] Temperature data for the period July 27, 1994 to August 18, 1994 and August 19, 1994 to August 31, 1994 were taken from CEHR's Daily Record for Medaka Fry log and Daily Record for Adult Medaka log, respectively. Temperatures on July 29, 1994, August 2, 1994, August 18, 1994, and August 24, 1994 were taken from CEHR'S Water Quality Data Record log. All other data were taken from CEHR's Water Quality Data Record log (USACEHR, 1994/1995c). A blank space indicates that no measurement was taken.